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Medical Library

# The Physiotherapy Review

Volume 24 Number 3

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# The Physiotherapy Review

*Published Bimonthly by The American Physiotherapy Association*

**Volume 24** **MAY-JUNE** **Number 3**

## Home-Made Exercise Devices for Physical Therapy:

### *With An Evaluation for Field Use*

**Ila Jane Amrhein, 1st Lt., P.T.A., M.D.**

When the armed forces began their great war training program, a unique medical problem soon became of pressing importance. Military training made physical demands upon the new soldiers that thousands of bodies were unable to withstand. Hands accustomed only to typing or writing often were twisted, strained and broken when forced to lift awkward machine guns, handle heavy tools or support the weight of human bodies hurtling across streams on ropes. Thousands of soldiers accustomed only to walking on smooth streets at a leisurely pace received sprained ankles and every known fracture when forced to run, jump and climb with heavy packs on their backs. It became the imperative problem of the orthopedic and physical therapy clinics to restore these men to peak efficiency in less time.

At this clinic the shortage of trained assistants and adequate space made it impossible to take care of the cases by peacetime methods of treatment. For these reasons several means of expediting periods of treatment and convalescence were considered, but it soon was obvious that real progress could be made only with the patients' cooperation.

The oldest and best method of physical therapy is auto-physical therapy, which of course carries along its own psychotherapy, but which requires adequate equipment at hand for the patients' use.

Station Hospital, Aberdeen Proving Grounds, Maryland.

Since it was not available, the next step was the construction of devices which would satisfactorily serve this purpose. After experimentation, three basic pieces of equipment were originated: a wrist exerciser, an ankle exerciser and a wooden cone.

The first two devices were designed primarily as adjuncts to whirlpool treatment, and therefore it was considered important that they be constructed of durable material. For this reason metal was used in the initial construction of the wrist and ankle exercisers.

It was a natural progression from the patients' use of these devices during whirlpool treatment to between-treatment exercise in the wards and barracks. Here lighter, more economical wooden construction proved its value. When it became apparent that this added exercise helped even more to shorten the recovery period, the value of the wooden models for field use quickly was foreseen.

The technical experience and equipment necessary to construct the metal exercisers were furnished by the personnel of the Base Shop Division of the Ordnance School. Later, when wooden models were substituted, the design and construction of the ankle exerciser were furnished by the Base Shop Division while the wrist exerciser and cone were constructed, from sketches by the author, by the Medical Department Carpenter Shop, and later were blueprinted by the Base Shop Division.

### THE WRIST EXERCISER

The original metal wrist exerciser had an adjustable bar to fit any size and shape of wrist (Figure 1). In the wooden construction the piece may be cut to fit the individual wrist. All that is necessary is that the distance from the anterior wrist to the metacarpophalangeal joint and the distance across the dorsum of the hand be measured, then a rectangle of that size be cut in the board. The most important feature of its use is that slow, even pressure may be exerted in opposing directions so that motion from no

*Figure 1. Metal wrist exerciser. Metal bar may be adjusted to fit any size or type of wrist. (Aberdeen Proving Ground Photo.)*

*Figure 2. Wooden wrist exerciser. Simplicity of construction permits cutting to fit individual wrist. (Aberdeen Proving Ground Photo.)*

*Figure 3. Metal ankle exerciser. Illustration shows position of dorsiflexion. Adjustable bar is fitted tightly across Achilles tendon. (Aberdeen Proving Ground Photo.)*

*Figure 4. Wooden ankle exerciser in dorsiflexion. Make-shift materials do not affect efficiency of results. (Aberdeen Proving Ground Photo.)*

*Figure 5. Wooden ankle exerciser in plantar flexion. Ingenuity in use as well as in construction gives these devices many uses. (Aberdeen Proving Ground Photo.)*

*Figure 6. The cone. Stretching scar tissues and toughening stump stimultaneously. (Aberdeen Proving Ground Photo.)*

other joint may be substituted. It is necessary to round off all the interior edges of the wooden model or to pad it with cloth to protect sensitive tissues.

The wrist exerciser was designed to permit assistive and passive extension of the wrist and fingers (Figure 2). The position of the apparatus may be reversed for flexion with pressure applied to the anterior wrist and to the dorsum of fingers or hand.

### THE ANKLE EXERCISER

The ankle exerciser also was designed for adaptability to the size and shape of the individual user. On the metal model the posterior bar is adjusted to fit tightly across the Achilles tendon in dorsiflexion and under the heel in plantar flexion (Figure 3). The shoe is used for protection against pressure, and the strap across the ankle is included to insure even pressure on the ankle joint from opposing directions.

The same effect is assured in the wooden model if it is constructed with a small angle at the junction of the two boards so that the upright one presses the counter of the shoe to prevent it from slipping. This small angle and the angle made by the insertion of the forked limb into the roller were discovered to be the secrets of success in the wooden model (Figure 4). Incidentally, the simplicity of the construction is shown by the fact that tree branches were used for this construction. If the bark is left on the bottom roller there is more traction against the floor and therefore less slipping.

The value of the ankle exerciser is twofold: First, there is the fundamental achievement of the patient's being able to begin assistive, passive, active and resistive exercise before he is allowed to bear weight on the affected extremity. Secondly, he is able to maintain, in the ward, the range of motion obtained in the clinic and through active exercise to develop strength in atrophied muscles. Use of the wooden exerciser is illustrated in Figures 4 and 5.

### THE CONE

One of the most useful pieces of equipment for exercise of the hand, wrist and fingers is the cone. Designed primarily to stretch contractures of the interdigital web of the thumb and forefinger, its use has evolved into a number of other essential exercises for the hand. The heavy

*Figure 7. Use of the cone in forced pronation with aid of other hand. (Aberdeen Proving Ground Photo.)*

base is essential for pendulum weight, and the size may be varied to suit individual needs. If the surface cannot be enameled, a smooth gliding surface may be achieved by sanding and either waxing or powdering to protect tender skin. Utmost smoothness, in any case, is essential.

The uses of the cone are a challenge to the ingenuity of the patient. He may stretch the interdigital web of his fingers and also may actively exercise the adductors and abductors of his fingers by trying to lift the cone from the same position. In addition, he may stretch the scar tissue and toughen a stump at the same time (Figure 6). If it is necessary to increase the pronation and supination of the wrist, the patient may grasp the cone and use it as a pendulum to passively force the wrist in pronation (Figure 7) and to actively exercise it in supination. This process, of course, can be reversed.

If the patient's hand should be too weak to grasp the cone strongly enough to lift it, the other hand may be used to assist it until the injured part gains sufficient strength to handle the exercises alone. The graduating size of the cone allows progression in active and resistive exercise to all the flexors at whatever range of motion may exist at time of treatment.

### STUDY OF TREATMENT RESULTS

Study of the figures in the chart below present some interesting results of the three types of therapeutic devices discussed.

The most obvious result of the study of the 63 patients was that the average recovery period was shortened to 14 treatments. When the period of convalescence can be cut to twenty-five per cent or more, thereby releasing men to active duty in less time, it is an obvious gain of medical importance to field units as well as to training units.

The results achieved in this clinic are dependent in a large degree to the fact that the use of whirlpool and diathermy were the primary methods of treatment, while the use of the devices described in this article was essentially as aids. Where whirlpool and diathermy are not available in the field, however, these aids will serve an extremely useful function alone, for they will enable the patients to maintain an uninterrupted range of motion throughout the period of convalescence.

## CHART 1

**Cases Treated in Nine Month Period, February to October 1943, Inclusive.**

| *Affected Part* | *Condition* | *No. Patients* | *No. Treatments* | *Average No. Treatments Per Patient* |
|---|---|---|---|---|
| Ankle | Sprain | 4 | 52 | 13 |
| | Fracture | 34 | 578 | 17 |
| Wrist | Sprain | 4 | 44 | 11 |
| | Fracture | 21 | 294 | 14 |
| | Total | 63 | Total 968 | |

Total Average Number of Treatments per Patient: 14.

Assistive aid is of no less importance to the patient himself. To be able to begin early treatment prevents the patient's morale from slipping as it would inevitably under the inactivity of hospitalization. When he can see definite improvement from his own effort almost from the beginning, the will of the patient for quicker recovery is strengthened, and this, too, is a real aid to quicker and more complete recovery.

As mentioned at the beginning of the article, physical therapy clinics are disproportionately overcrowded because of the great strain imposed on bones and joints by modern training. When a great part of the patient's treatment can be done by the patient himself in his ward or barracks, physical therapy personnel has just that much more time and space for new patients.

Finally, there is little doubt that recovery is generally more complete, for under existing conditions it would be impossible to give the quality of treatments needed to take the place of the patient's active exercise.

## Exhibits Available

1. "Reproductions of the Pictures on the History of Physical Therapy":
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2. A motion picture film 200 feet long, on "Massage." (16 mm.)
3. "Posture Plays an Important Part in the Physical Therapy of Bed and Convalescent Patients":
   6 posters, 22x28 inches, in frames with photographs showing: good and bad posture of a patient in bed; good and poor posture in a wheel chair; instruction in walking with crutches and with a "walker." Weight when packed for shipping approximately 60 pounds.
4. "Statistical Map" showing schools approved by the American Medical Association, location of American Physiotherapy Association Chapters, Membership, etc. Weight when packed for shipping 46 pounds. This is in pastel colors. Should be displayed on an easel as it is too heavy to hang. Size 45x35 inches.
5. Poster 22x28 on the American Physiotherapy Association. "Requirements for Membership, Curriculum Content, Scope, Membership and Chapter Growth."
6. A motion picture film (16 mm.) "The Maintenance of Neutral Position of Patients with Infantile Paralysis During Nursing Care in the Hospital and in the Home."
7. Poster showing publications of the American Physiotherapy Association individually mounted (with request slips).
8. Poster: "The Nation Needs Physical Therapists."
9. Poster on pool construction and design.

For information regarding these exhibits, write Dorothy Dean, Exhibits Chairman, P. T. Dept., 303 East Chicago Avenue, Chicago 11, Ill.

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The Blue Booklet, "The American Physiotherapy Association is Organized to Serve"
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# An Emergency Plan
# In High Incidence Poliomyelitis

**Eloise Draper**

Many of the crippling effects of poliomyelitis were prevented by an emergency program of one California county with a recent high incidence of the disease. This program, set up in the summer of 1943, brings evidence that even with limited personnel the damaging results can be held to a reasonable minimum. Briefly, the work was done by the existing nursing service of the County Public Health Department, the isolation ward of the County Hospital and one Kenny trained physical therapy technician, sent in by the State Department of Public Health. The technician was borrowed through the National Foundation for Infantile Paralysis. Kenny technic was used entirely in all cases referred, which was about 90 per cent of the total cases reported in the county.

The county, largely rural in character, was experiencing a wartime "boom." Its one city, situated on the coast, whose normal population was 20,000, had grown in two years to approximately 120,000 and was in the process of organizing a new Health Department. Emergency housing and resultant overcrowding complicated health problems, and the health services of both city and county were severely taxed. This is best illustrated by the fact that the isolation ward at the County Hospital was running close to its 12 bed capacity with only the usual needs of contagion. The county, however, was not altogether unprepared for a poliomyelitis outbreak.

An educational program for the care of poliomyelitis had been in progress for three months when the first case appeared. The supervising nurse of the County Health Department had been sent to Minneapolis for training in the Kenny nursing technic, as a result of the scholarship offered by the local chapter of the National Foundation for Infantile Paralysis. Her enthusiasm for the treatment and her personal abilities were responsible for the spread of interest and information throughout the area. In January she began a series of lectures, giving demonstrations in packing technic and stressing the threefold teamwork of physician, nurse and technician. She spoke before women's clubs; the Lions Club; Soroptomists; B. & P. W. Clubs; Nurses Aide classes; church clubs and groups; registered nurses' associations; convention of district federation of Parent-Teacher Association; convention of Federation of Women's Clubs; Red Cross; school, county and city Public Health Nurses; nurses schools, and medical auxiliaries.

By this means approximately 3000 or more people were informed. Everyone understood the need of a physician and a nurse, but difficulty was encountered when the duties of the physical therapy technician were explained. Very few people had ever encountered this profession. "Packing," the first great nursing need, was understood; it remained for the emergency to emphasize the need and work of the physical therapy technician.

The first case of poliomyelitis came in March. With the help and guidance of the supervising nurse the small isolation ward in the County Hospital was set up for packing. Everything proceeded in order. But soon there were more cases —then more. In May the Health Department was thoroughly aware of the danger, both because of the situation at hand and reports coming in from over the state. By June the situation was getting out of hand. Frequent requests for a technician were made to the State Department. A school nurse, the superintendent of nurses at the County Hospital and the night supervisor, financed by the local chapter of the National Foundation for Infantile Paralysis, were sent for training in packing technic.

Hospital services in the isolation ward were being stretched beyond capacity; by July first home care had become a necessity. Mothers were

2335 Russell Street, Berkeley 5, Calif.
State Department of Public Health, Division of Crippled Children's Services, California.

given instruction and supervision by the county nurse and her one school nurse assistant. But children were being left in weakened and crippling conditions. Nurses were doing their best to give exercise when they knew it was needed. Nearby hospitals with trained technicians already were overloaded with patients from their own and outlying districts which had no facilities of any kind.

It was an overworked group of nurses that welcomed the news of a "lend lease" Kenny trained technician. Along with many others, she had been made available by the National Foundation for Infantile Paralysis to the State of California to help in the emergency. Her arrival was greeted with "now we feel our problems are solved" by the county supervising nurse who had worked tirelessly and continually, asking for this type of help. It was now possible to use the three man team—physician, nurse and technician—the very best answer for the problem at hand.

For the technician the problem had just begun. It was August 4th and she was presented with 60 cases, only 10 of which were in the hospital. There was no assurance that this number would not increase because new cases were being reported daily. The time had come, however, for "something new to be added." The first thing to be done was to get a picture of the whole situation and formulate a plan. This meant the immediate muscle analysis of every reported case with a physician's order for physical therapy, the classification of these cases, and the coordination of work to include both hospital and home.

Taking into consideration the needs as stated by the supervising nurse, a plan was put into effect. The twelve bed isolation unit at County Hospital was used as headquarters. Days were divided so that mornings were spent there and afternoons given over to home visits. All cases in the hospital were referred by the resident physician for muscle analysis and treatment, which began immediately. Home cases (both acute and early convalescents) which had physician's orders for treatment, were seen in company with the supervising nurse for analysis purposes only. It took three weeks to make the survey and discover the physical therapy needs throughout the county. Seriously involved cases were given immediate attention. Fortunately there was no problem connected with packing—a splendid educational job had been done.

The working schedule which grew out of the survey was as follows:

| | A.M. | P.M. |
|---|---|---|
| M | Hospital | Hospital Clinic |
| T | Hospital | City Clinic |
| W | Hospital | County Home Calls |
| Th | Hospital | Hospital Clinic |
| F | City Home Calls | City Clinic |
| S | Hospital | |

The above schedule was adhered to generally but the only regular hour possible to keep was going on duty at 8:00 A.M. and the 1:00 P.M. clinic hour. Saturday afternoons and Sundays frequently were used to make up any lost time still due patients.

The criteria used by nurse and technician for decisions on care of patients were as follows:

1. Order from physician in charge of case.
2. Condition of patient.
3. The household.

In order to facilitate maximum attention for each patient, specific plans were worked out for both nursing care and physical therapy. The following outline lists them briefly:

### NURSING CARE

*Hospital:*

1. Chief packer—a registered nurse.
2. Three nonprofessional locally trained assistants.
3. Three electric washing machines.
4. One registered nurse worked four-hour evening duty.
5. Four daytime packers worked eight-hour duty.
6. Packers worked alone.
7. Chief packer assigned patients to packer and each one handled only these patients.
8. The National Foundation "Guide for Nursing Care of Patients with Infantile Paralysis" was used as a work manual.
9. Special packing for bulbar cases was done by special nurse, by floor nurses and the technician.
10. Patients were isolated at home or discharged as soon as condition warranted, if hospital beds were needed.
11. Patients were retained beyond isolation period when condition demanded daily treatment and there was no room in nearby hospitals staffed with trained technicians.

12. Four, six, eight and continual pack sets were given patients according to individual needs.

*Home:* 1. Public Health Nurse taught mother packing and visited home to supervise and help plan a packing program, which differed with each household.
2. Public Health Nurses carried lists of sources for blankets, safety pins, hand wringers, ply-board and substitutes.
3. Directions for preparing the beds were given by the nurses, who checked frequently to see that orders were followed.
4. When muscle analysis revealed need for extra packs, the nurse communicated with the physician and then saw that whatever he wished done was carried out.

PHYSICAL THERAPY

*Hospital:* 1. Daily treatment on specially built treatment table. No orderly help was available.
2. Bedside treatment daily for acute stage patients.
3. Severely involved convalescents were brought in from homes for daily treatment.

*Home:* 1. Convalescents whose parents had no way to get to clinic.
2. Acute cases not hospitalized.
3. Treatments given only once a week, at bedside, or on the kitchen or dining room table.

*Clinic:* 1. Treatment for convalescents given once or twice a week, according to seriousness of involvement.
2. Check-up surveys for so-called recoveries, once a month.
3. Patients were carried or brought in by wheelchair if their involvement made it necessary.

Reorganization of homes was astonishing. Few households consisted of less than five people. They were quartered in trailers, war apartments of one or two rooms, cottages of three or more rooms. Fathers were busy hunting up washing machines, wringers, tubs, safety pins, blankets, waterproofing, boards for footrest and mattress. When supplies could not be secured from local markets relatives from a long distance would send needed articles. Husbands and fathers made excellent packers, one father dubbed himself "Brother Kenny." For once the word "mother-in-law" was synonymous with "Angel of Mercy." Besides mother, the chief packer might be any member of the family.

Labor saving devices were developed in almost every household. If fathers failed to work out something, "the men at the office or plant" would make it. Some of these ideas were: (1) A kitchen chair equipped with roller bearing casters to serve as a wheel chair. (2) A square platform, similarly equipped, upon which a chair could be placed. (3) A stretcher on wheels was made by one father for his boy who could neither sit up nor stand. (4) A box-like scooter, equipped with a foot support so that patient could get a ound without help and at the same time prevent stretching of a dropped foot. The entire community made every effort to give aid to the victims.

Teamwork between the public health nurse and the technician was particularly valuable in taking care of home patients. On all home calls a public health nurse accompanied the technician. These visits consisted of: (1) Kenny technic physical therapy treatment routine. (2) Check-up by the nurse on the nursing care, needs for equipment, and giving information as to where needs could be answered. (3) Record made of the patient's progress by the technician. (4) Developments discovered, explained to nurse to be reported to the physician by her. (5) Occupational therapy suggestions. (6) Home school arrangements. (7) Practice of standing or walking to be done. Working together gave full opportunity for mutual understanding and cooperation besides being a means to double check on physician's orders. This appeared to be the only way the physician-nurse-technician team could function.

This whole plan, born of necessity, was carried on with trepidation, for early and daily care is absolutely vital. However, here was an emergency and results were far from discouraging. Patients were well packed, extra packs and patches were done well at home and in the hospital, and most important, the patients were progressing. They were happy, ate well and gave full cooperation.

Out of 113 cases, 87 have been selected to evaluate the program because they run parallel in that (1) they came under care immediately a technician was brought in or (2) they came under care immediately on diagnosis. Percentage of return:

50 per cent excellent, with return to normal occupation, school or play.

14 per cent good, not yet returned to normal activity.

14 per cent fair, no complete paralysis, but with definite weakness.

22 per cent with definite loss of one muscle to one or more muscle groups.

The cases not selected for study are presented here also, as explanation.

| *Patients* | *Total* | *Condition* *Good* | *Bad* |
|---|---|---|---|
| 1. Removed from any service by parents | 2 | 1 | 1 |
| 2. Removed to other states for follow-up care | 2 | 1 | 1 |
| 3. With varied care during the acute stage | 3 | | 3 |
| 4. Cared for by osteopath or chiropractor during actute stage | 3 | 3 | |
| 5. Removed from service after five months care on this service and placed in brace by physician | 1 | | 1 |
| 6. Removed from service immediately after acute stage by private physician | 3 | 3 | |
| 7. Brought or sent in by physician for regular analysis of muscles | 9 | 9 | |
| 8. Removed from service and placed under chiropractic care by parents | 2 | | 2 |
| 9. Under temporary care | 1 | | 1 |

Note: "Good" indicates no loss of function. "Bad" indicates definite loss of function which appeared permanent.

As the findings stand today with correction as to onset, results will have to wait at least a year before any definite conclusions can be drawn. Four striking things were noted, however, which seem worthy of consideration. (1) A number of cases with trunk or extremity involvement in the acute stage made good return within two months of onset having only one physical therapy treatment per week in addition to good nursing care. (2) Cases with involvement of a severe nature treated twice weekly did not develop incoordination. No home exercises were given to be done at home except sitting, standing, walking and tricycle riding, as the patient was able. (3) No scoliosis has developed in any of the cases in the percentage table. (4) Patients with arm involvement were urged to attempt normal use of the hand such as eating, tying shoe laces and managing buttons, and these patients gained in strength and coordination.

## CONCLUSION

A practical program for the care of poliomyelitis can be set up with the use of Kenny technic during a period of high incidence. Such program requires full understanding and cooperation of the physician-nurse-technician team. A total of 100 patients can be treated from one to six times a week by the use of home calls, clinics and a hospital ward. Such a procedure is not recommended except under emergency conditions such as a high incidence with a wartime personnel, or an epidemic.

With a wartime scarcity of physicians, nurses and technicians, and overcrowded hospitals, home care is of practical advantage in epidemic poliomyelitis. The public health organization is an excellent vehicle for handling the cases both for nursing care and physical therapy. Full cooperation between the public health nurse and the physical therapy technician are highly valuable for the best interest and progress of the patient. Recovery of the patient may be slow—even hampered—by the lack of daily treatment. Patients can be held at a reasonable level of recovery by the use of Kenny technic at home until there are hospital beds ready to receive them or until good recovery is assured without hospitalization.

---

## Hands

Such Fragile Hands; but, Oh, so sure the touch
On throbbing nerves, on bodies torn with pain!
Such Little Hands; but, Oh, the gentle pressure as
Nerves respond, and muscles move again!
Such Willing Hands; so swiftly moving, as if
Each arduous task were but a touch of love!
Such Tired Hands; when twilight ends the day
of mercy!
Selflessly, hour on hour, incessantly they plod.
Such Blessed Hands! Where come they but from
God?

*—A tribute to Lieut. Helen L. Hermann, Chief Physical Therapist, Halloran General Hospital, Staten Island, N. Y., by Anna Carroll Reaume, Brookline, Mass.*

# Rehabilitation of Knee Injuries

**Edward D. O'Donnell**

Although a great deal is known about the cure of knee injuries, in too many instances the "game" knee acquired in sports persists for years if not for life. All the reasons for this state of affairs cannot be given. There are many kinds of knee injuries—some more serious than others. The varieties, however, can be grouped as ligamentous, cartilagenous, muscular and bony injuries. These are not to be confused, in the present discussion, with other knee conditions, such as arthritis, tuberculosis and so forth, which are in a different classification.

Of the knee injuries, ligamentous ones are probably the most frequent. In fact it is hard to see how cartilagenous, muscular or bony injuries can occur without the simultaneous tearing of some ligaments. In cartilagenous injuries the cartilage usually must be removed; in muscular injuries, the muscle repaired; and in bony injuries, the fracture treated. But in all these conditions there are the damaged ligaments which must receive attention.

The purpose of this paper is twofold: to describe effective methods of reestablishing the strength and action of injured ligaments; and to show how the structure of hitherto uninjured knees is developed to meet the demands of contact sports and activities.

It is well known that muscles lose their nutrition and tone very quickly when not in use. Ligaments likewise lose their strength when immobilized. In order to bring back normal function in the knee it is essential that normal muscle strength and ligamentous strength be regained. This is not by any means always accomplished by the usual knee rehabilitation exercise. Too often it consists simply of knee extensor exercises or quadriceps setting. Partial or complete immobilization of the knee includes, to a greater or less degree, partial immobilization of the hip and ankle. There are a number of muscles which act on the knee and thigh (rectus femoris) or the knee and ankle (gastrocnemius). The hamstrings also have a double action, on knee and hip. All of the muscles of hip, knee and ankle must be given attention if a complete muscular rehabilitation is to be effected.

Ligamentous strength can be redeveloped only by action throughout as full joint range as possible without straining the newly healed ligaments. Immobilization causes diminution of circulation which weakens the ligaments. In order, therefore, to bring back normal strength it is necessary first to increase ligamentous nutrition by increasing circulation.

Fatigue predisposes to injury. The knee is a relatively unstable joint and must bear the entire weight of the body. Therefore, under the influence of fatigue it is especially susceptible to giving way. The healing of a torn ligament usually is a slow process and its bearing of weight must be limited until healing is complete. This limitation prolongs disability and allows the general physical condition to suffer from the enforced inactivity.

As soon as the attending physician will permit rehabilitation exercises to be started, the physical therapist should carry out the massage, motion and muscle strengthening as prescribed. The physician usually prescribes treatment in general terms, leaving the details to the physical therapist. The completeness of the resultant cure depends on the details of the treatment and on the amount of attention paid to all the muscles and their varied actions.

Certain fundamentals must be borne in mind. In the first place, it is essential to avoid lateral strain in carrying out either active or passive motion. Secondly, complete extension should be achieved at the end of each motion or contraction. Third, attention should be given to all of the muscles which in any way control the knee joint. Too often, only quadriceps action is stimulated either by active extensor motion or by "quadriceps setting." The hamstrings suffer equally from atrophy of disuse following injury. The gastrocnemius is a knee flexor and becomes weakened, lessening in turn the strength of the

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ankle and thus contributing subsequently to additional knee strain. The synergistic action of muscles in carrying out a complicated automatic motion, such as walking or running, definitely is disturbed by the weakening of certain muscles following injury. Such disturbance may exist for long periods of time and result in uneven and eccentric muscle pulls. This is a potential danger, leading to further knee damage, especially if there is a greatly prolonged period of disability. In the early stages of recovery, therefore, the massage ordered should include not only quadriceps massage, but massage of the hamstrings as well. And it should be applied to all of the muscles actuating the ankle and hip, because of their relationship to knee function. Thus massage should be carried out from the ankle to the buttock on both anterior and posterior aspects of the leg.

Passive motion probably need be confined only to the knee. But various degrees of active motion, with or without assistance, should be given. The knee should be carefully supported during such motion. The ankle motions include, of course, dorsiflexion, plantar flexion, pronation, supination; and the hip motions, flexion-extension, abduction-adduction and internal-external rotation. These motions can be gradually increased until considerable resistance in all directions is used, always provided that the knee is held so all possible strain is avoided.

The passive motion used for the knee in the early stages of repair must be carried out very gradually. It is important to hold the knee in such a way that no lateral stress occurs and that the motion is limited to that range which neither causes any muscle spasm nor pain. Both pain and muscle spasm are warning signals that strain is being produced. This strain may result from incorrect angulation of the calf-thigh alignment or may be the result of too rapid motion. Full and complete extension must be aimed at, but flexion should be limited to that amount which can be obtained easily and comfortably, since the volume capacity of the synovial cavity is decreased by flexion, and in the presence of any residual effusion, the fluid will be under pressure.

Active motion should be utilized as soon as possible, but the knee action should be assisted or guided carefully to prevent lateral strain. Careful attention should be given to the quadriceps to see that it is contracted smoothly and evenly and without sudden jerks. The vastus medialis comes into play only in the last five or ten degrees before complete extension. The redevelopment of this portion of the quadriceps is very important in obtaining a really stable knee. This muscle can be identified as a small rounded mass which contracts above, and medial to, the patella only when full extension is about to be reached. If this muscle remains weak, the instability of incomplete extension is sure to occur.

It is equally important at this stage to be sure of hamstring exercise. Very often the patient is in the sitting position and under these circumstances flexion is purely a function of gravity. Since the leg must be extended against gravity by the quadriceps, this is the only muscle exercised, the leg merely being allowed to drop into the flexed position. The attachment of the hamstrings must be kept in mind, however, because resisted knee flexion, unless very carefully carried out, will tend to pull the tibia backwards on the femur. This latter must be avoided in the case of relaxation of the crucial or even lateral ligaments. This exercise is best carried out in the prone position, the physical therapist assisting and steadying the joint position. The relationship of the two bones comprising the knee joint must in a similar way be controlled when resisted gastrocnemius contractions are carried out.

Abduction, adduction, internal and external rotation of the hip give valuable assistance because of the synergistic action of these muscles with those of the knee. When the knee is hung over the table, flexion, extension and circumduction exercises of the hip, as well as inversion and eversion of the ankle, are found to be of value in restoring stability of the knee. More emphasis should be placed on the use of exercises which will help to bring about a sound knee by the gradual development of all motions of the ankle, knee and hip. Little attention has been paid in the past to the importance of the synergistic muscles that help the knee to function normally. No knee should be given any weight bearing exercise until all pain and local tenderness have disappeared.

Diminution of effusion also is an indication for preliminary weight bearing exercises. The contraction of extensor muscles should be encouraged at all times during disability. Valuable results in the prevention of unnecessary atrophy have been obtained through this procedure. Special nonweight bearing exercises at hourly intervals are very beneficial. The disability time sometimes is reduced greatly by this method. Too often physical therapy treatment is given only once every twenty-four hours. Experience has shown that relatively less improvement takes place through this method than when the patient does special exercises for five to ten minutes at frequent intervals. In this way maximum results are obtained quickly. Fatigue should be avoided

at all times during the period of exercise.

Heat, in the form of baking, hot fomentations, infra-red, short periods of diathermy or short wave is most helpful in giving temporary relief from pain. But heat, in any form, should not be administered more than fifteen to twenty minutes, for it may bring about vasodilation and possibly more hemorrhage. Massage, in the form of light stroking to help absorb exudation, and relaxation in the early stages have proved valuable. Later, when the tenderness and local swelling is diminished, kneading, cupping and rolling are beneficial to the muscles. The Ille whirlpool bath has gained great favor in the treatment of athletic injuries. Less pain occurs and massage can be given to the most acute injury by this hydro-turbine spray. Any desired amount of pressure can be given to the injured part. It is one of the most valuable adjuncts in the treatment of injuries. Hot towels also are recommended as a useful measure in employing heat.

With the application of some form of heat and proper massage, active or voluntary exercise should be begun by the patient. Exercise should never be continued when there is any pain or discomfort. Gradual increase of exercise periods should continue during the period of disability. Nonweight bearing exercises would include the following:

1. Quadriceps setting or contractions.
2. Extension of knee.
3. Flexion of knee.
4. Ankle flexion and extension of circumduction.
5. Internal rotation of hip.
6. External rotation of hip.
7. Abduction of hip.
8. Adduction of hip.
9. Active circumduction of hip.
10. Sitting on table and alternate swinging.
11. Crossing one leg over the other and resisting in flexion and extension.
12. Placing a pillow between the legs and with the knees turned inward squeezing the pillow.
13. Resisted flexion—extension—adduction—abduction—internal-external rotation of knee, hip and ankle.
14. Placing a five pound sandbag over the dorsum of the foot and swinging it for five minutes every hour.
15. To help get more extension of knee, place heel on desk when sitting in chair.

Automatic resisted exercises:

16. Swimming.
17. Rowing machine.
18. Bicycle riding with seat high for ten minutes and low for ten minutes.

When complete extension and flexion is obtained against gravity, and when no supporting bandage is necessary, weight bearing exercises such as the following may be started:

19. Walking up and down stairs, or running.
20. Sitting and rising from a chair fifty times.
21. Lunging forward, as in fencing.
22. Walking on tip toes.
23. Walking on heels.
24. Duck walking.
25. Frog walking.
26. Skipping rope.
27. Hopping on one leg—forward, backward, sideways.
28. Running—on the spot, with knee raising to chest, alternately.
29. Jogging.
30. Squatting at three heights, never complete squat at one time.
31. Zig-zag running.

Too often, further damage is done because complete flexion and extension have not been obtained. When emphasis is placed on nonweight bearing procedures, a quicker result and a more useful knee can be expected.

Throughout the period of treatment comparative measurements of the circumference of both thighs and calves should be made at least at weekly intervals to determine the rate of increase in size. These measurements of the thigh are conveniently made at distances of three, six and nine inches above the patella. In the calf, only one measurement at the largest circumference is necessary.

In the early stages between treatments, bandaging with semi-elastic bandages over felt strips is recommended to avoid any unexpected strains resulting from sudden changes of position. This form of support should follow the adhesive strapping which is usually applied by the physician at the time of examination. It is unwise to go from the comparatively strong support of adhesive to no support at all without the intermediate bandage.

The question of the advisability of a knee brace, of course, must be decided by the physi-

cian and its use would depend on the severity of the original injury.

This method of treatment has produced highly satisfactory results by shortening the time of disability and by increasing the percentage of complete restorations of function without recurrence in 500 cases of knee injuries occurring in athletic sports.

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# Schools for Physical Therapy Technicians

The House of Delegates of the American Medical Association in 1934 requested that some plan be effected for the establishment of standards, ratings and inspections of schools for the training of physical therapy technicians. The Council on Medical Education and Hospitals assumed responsibility for this program and by 1936 had completed a survey of these schools. Certain minimum standards were formulated. These were presented to the House of Delegates of the American Medical Association and were ratified in May 1936. The first published list of 13 approved schools for physical therapy technicians appeared in THE JOURNAL in August 1936. At present there are 28 approved schools.

Six month emergency courses continue to be popular. The 17 schools approved for this type of training produced 235 physical therapy aides last year. After obtaining an additional six months of experience in army hospitals, these students are eligible for registration examinations. Individuals who are planning to work in civilian hospitals should not take the emergency course but should enroll in the regular course, which is presented in nine or more months of instruction. The 23 schools offering the regular course graduated 190 students in 1943. Emergency and regular programs trained 435 students, or an increase of only 9 over the previous year.

Army needs for properly trained physical therapy technicians or aides were much greater than the total graduates. Estimates of Army and Navy needs for the current year are over twice the present number of graduates. In fact the needs exceed not only the 719 anticipated graduates during 1944 but also the maximum capacity of both the regular and the emergency courses, or 816 students. Next year the Veterans Administration and rehabilitation programs will probably require equally large numbers of graduates. To meet these demands there must be more schools approved, and greater effort will be required to encourage more students to enroll.

Only four of the approved schools require more than the minimum entrance requirements of two years of college credit. Ten of the schools have courses arranged so the students can receive from 20 to 50 semester hours of credit toward a degree, while one four year program grants 131 credits. Tuition is not charged for seven of the emergency courses and three of the regular curriculums. A total of 220 graduates were produced by these ten courses. Other schools charge from $72 to $432 a year, but many of the higher tuitions are university fees. The mean tuition of all emergency courses remains at $200, while the average has dropped to $132. Tuition for the regular curriculum averages $212, while the mean is $200.

Universities, medical schools, colleges or hospitals having suitable facilities in physical therapy are urged to consider the establishment of acceptable programs in this field.

For further information regarding the approval of technical courses, communicate with the Council on Medical Education and Hospitals. Individuals desiring registration should write to the American Registry of Physical Therapy Technicians, 30 North Michigan Avenue, Chicago 2.

# Schools Approved for Training Physical Therapy Technicians

***By Council on Medical Education and Hospitals of the American Medical Association***

| Name and Location of School | Entrance Requirements* | Emergency Course | | | | Regular Course | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Length in Months | Classes Start | Tuition | Certificate, Degree, Diploma | Length in Months | Classes Start | Tuition | Certificate, Degree, Diploma |
| Army and Navy General Hospital, Hot Springs National Park, Ark. | † | 6 | JanJul | None | Certificate | .. | ..... | .... | ..... |
| Children's Hospital, Los Angeles | a-b-c | 6 | FebAug | $200 | Certificate | 12 | FebAug | $200 | Diploma |
| College of Medical Evangelists, Los Angeles[1] | a-b-c | .. | ..... | .... | ..... | 12 | JanJuly | $215 | Certificate |
| University of California Hospital, San Francisco[1] | a-b | .. | ..... | .... | ..... | 12 | MarOct | $150 | Certificate |
| Stanford University, Stanford University, Calif[1] | a-b-d[2] | 7 | Quart. | $286 | Certificate | 10 | Quart. | $409 | Cert. or Degree |
| Fitzsimons General Hospital, Denver | † | 6 | FebAug | None | Certificate | .. | ..... | ..... | ..... |
| Walter Reed General Hospital, Washington, D. C. | † | 6 | Quart. | None | Certificate | .. | ..... | ..... | ..... |
| Northwestern University Medical School, Chicago | a-b-c | .. | ..... | .... | ..... | 9 | JulyOct | $200 | Certificate |
| State University of Iowa Medical School, Iowa City | b-c | 6 | MarSept | None | Certificate | 9 | MarSept | None | Certificate |
| Bouve-Boston School of Physical Education, Boston | a-b-c[3] | 6 | June | $250 | Certificate | 3-4 yrs. | Sept | $400 yr. | Dipl. or Degree |
| Harvard Medical School, Boston | a-b-c | 6 | MarSept | $250 | Certificate | 9 | MarSept | $300 | Certificate |
| Boston University Sargent College of Physical Education, Cambridge, Mass. | a-b-c | Given in conjunction with Harvard | | | | 19 | Oct | $435 yr. | Cert. & Degree |
| University of Minnesota, Minneapolis[1] | a-b-c[4] | .. | ..... | .... | ..... | 12 | March | $168[5] | Certificate |
| Mayo Clinic, Rochester, Minn.[1] | a-b-c | 6 | JanJuly | None | Certificate | 9 | JanJuly | None | Certificate |
| Barnes Hospital, St. Louis | a-b-c | .. | ..... | .... | ..... | 9 | Oct | $200 | Certificate |
| St. Louis University School of Nursing, St. Louis[1] | a-b-c[3] | 8 | JanSept | $250 | Certificate | 4 yrs. | JanSept | $250 yr. | Cert. & Degree |
| O'Reilly General Hospital, Springfield, Mo. | † | 6 | JanJuly | None | Certificate | .. | ..... | .... | ..... |
| Columbia University, New York City | a-b-c | .. | ..... | .... | ..... | 10 | FebSept | $390 | Certificate |
| Hospital for Special Surgery, New York City[1] | a-b-c | 6 | Jan | $200 | Diploma | 9 | Sept | $300 | Diploma |
| New York University School of Education, New York City[1] | a-b-c | .. | ..... | .... | ..... | 9 | FebSept | $432 | Cert. or Degree |
| Duke University School of Medicine, Durham, N. C[1] | a-b-c | .. | ..... | .... | ..... | 9 | Sept | $200 | Certificate |
| Cleveland Clinic Foundation Hospital, Cleveland | a-b-c | .. | ..... | .... | ..... | 9 | Sept | None | Certificate |
| D. T. Watson School of Physical Therapy, Leetsdale, Pa.[1] | a-b-c | 6 | AprOct | $200 | Diploma | 12 | Oct | $200 | Diploma |
| Graduate Hospital of the University of Pennsylvania, Philadelphia, Pa.[1] | a-b-c | .. | ..... | .... | ..... | 12 | JanSept | $200 | Certificate |

| Name and Location of School | Entrance Requirements* | Emergency Course: Length in Months | Emergency Course: Classes Start | Emergency Course: Tuition | Emergency Course: Certificate, Degree Diploma | Regular Course: Length in Months | Regular Course: Classes Start | Regular Course: Tuition | Regular Course: Certificate, Degree, Diploma |
|---|---|---|---|---|---|---|---|---|---|
| Brooke General Hospital, San Antonio, Tex. | † | 6 | JanJuly Oct | None | Certificate | .. | ..... | ..... | ..... |
| University of Texas School of Medicine, Galveston | a-b[6] | .. | ..... | .... | ..... | 9 | JanMar July | $130[5] | Certificate |
| Richmond Professional Institute, Richmond, Va. | a-d[6] | 6 | Sept | $200[5] | Certificate | 9-12 | Sept | $200[5] | Cert. & Degree |
| University of Wisconsin Medical School, Madison[1] | a-b[7] | 6 | AprOct | $72[5] | Certificate | 12 | AprOct | $96[5] | Certificate |

* Courses are so arranged that any of the entrance requirements will qualify students for training. a = Graduation from accredited school of nursing; b = Graduation from accredited school of physical education; c = Two years of college with science courses; d = Three years of college with science courses.

† For complete information regarding entrance to Army training schools write to Major Emma E. Vogel, Director of Physical Therapy Aides, Office of the Surgeon General, War Department, Washington, D. C.

1. Male students are admitted.
2. High school graduates accepted for a four-year course leading to A.B. degree; students admitted quarterly and tuition is $143 per quarter.
3. High school graduates admitted to regular course.
4. Medical technology graduates with B.S. degree also admitted.
5. Nonresidents charged additional fee.
6. Those with degree from any accredited college also accepted.
7. Students with two years of college admitted to emergency course only.

*For information regarding education write to Miss Mary Nesbitt, Chairman, Education Committee, Massachusetts General Hospital, Boston, Mass.*

## Directive for Emergency Courses

Dr. Victor Johnson, Secretary of the Council on Medical Education and Hospitals of the American Medical Association, recently sent the following letter to all schools approved for the training of physical therapy technicians:

"A few instances of schools sending their emergency course physical therapy students to unaffiliated civilian hospitals for additional practical experiences have been reported to the Council. Claims have been made that some of these students were released from their schools to gain practical experience in civilian hospitals or physicians' offices on a salary basis.

"The emergency course was designed to prepare large numbers of physical therapy aides for the armed forces. Students who cannot pass physical examination requirements of the Physical Therapy Corps or who do not care to obtain their practical training in the Army should *not* be enrolled in emergency courses but in the regular course which provides a minimum of nine months of instruction and supervised experience in hospitals affiliated with the school for the training of classes in physical therapy.

"Approved schools may also be approved for the emergency course if students can receive all of the didactic curriculum and at least 200 hours of supervised clinical practice within six or more months. These students may then be released to Army hospitals for an additional six months of Army experience. Only after this additional six months of Army experience should the school issue a certificate, diploma, degree or letter to the students.

"It is acceptable for both regular and emergency classes to receive their six months of didactic instruction simultaneously. Those students not released to the Army should be retained for at least three more months of training before being graduated."

# The Physiotherapy Review

*Editor-in-Chief:* MILDRED ELSON
*Business Manager:* HAZEL PUTMAN
*Associate Editors*
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BESS SEARLS

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Physical therapy had its inception in World War I. From then until now its growth has been slow but steady and healthy. Now in World War II it is proving its worth. This is not accidental. The years between the two wars have been spent in developing physical therapy in the experimental laboratory, in clinical research and in technician training. Twenty years ago the latter was of six to eight weeks' duration. This soon was found to be inadequate. As the scope of physical therapy increased, there developed a need for technicians with more basic knowledge of anatomy, physiology, pathology and greater technical skill. Courses were lengthened gradually and it became evident that minimum standards for technician training would have to be set up. This first was done by the American Physiotherapy Association as a basis for membership in the association. Later the American Medical Association was approached and since 1936 they have inspected and certified schools. Physical therapy is not a war industry. It is an established and growing profession in which the future is secure. It is a profession in which one must be willing to work, and work hard. We deal with people, sick people—men, women and children—and the satisfaction one receives from helping them is immeasurable.

The demand for technicians always has exceeded the supply. We need more technicians—schools are not up to capacity. More schools are advocated by the American Medical Association in their recent report, printed in this issue. We believe that the need can be met in schools already established. Teaching facilities are set up and the personnel is available. We do not know the needs of the armed forces, nor are there positive statistics on civilian needs, but there are many positions open which are not being filled, as shown by our vocational bureau.

The question conceivably can arise, where shall we find more technicians and how fast can they be trained? Let us all be alert to the problems confronting us. In order to meet this need, the American Medical Association has provided for emergency courses of six months which has speeded up the training. This is in accordance with allied fields, such as nursing. They also have reduced the minimum entrance requirements to two years of college with science courses. With an adequate publicity program, a large number of technicians should be available from the college group. Each chapter and each individual in civilian employment should consider it a duty to aid in the recruitment, particularly of college students. Pamphlets and reprinted material are available for distribution upon request to our National Secretary.

Our pride in our profession is great. The progress and recognition of physical therapy, as proved by its extensive use in the army, has developed over a period of years by the honest, everyday, careful work of well trained technicians. Less than that can never be accepted by us, by physicians, and most important—by our patients.

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### New National Office

After May 15, 1944, the National Office of the American Physiotherapy Association will be located at 1790 Broadway, New York 19, N. Y.

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Miss Florence Phenix has been appointed to the Nursing Unit, Division of Health Services of the Children's Bureau, U. S. Department of Labor as special consultant nurse in Crippled Children's Services. She will act as special consultant to state agencies in orthopedic nursing and physical therapy as arranged by the regional offices of the Division of Health Services of the Children's Bureau. Her headquarters will be in Washington.

# Annual Conference of the American Physiotherapy Association

***Pennsylvania Hotel, New York City***

**May 17 to 21, 1944**

| | *Wednesday, May 17* | *Thursday, May 18* | *Friday, May 19* | *Saturday, May 20* | *Sunday, May 21* |
|---|---|---|---|---|---|
| 9–12 a.m. | Physical Therapy Schools Section | Chapter Problems | Rehabilitation: Analysis of existing plans | Rehabilitation: Panel Discussion | Association Business Meeting |
| 12–2 p.m. | | Crippled Children's School Section Luncheon** | | Public Health Section Luncheon** | |
| 2–5 p.m. | Association Business Meeting | Infantile Paralysis Round Table | Rehabilitation: Analysis of Existing Plans (cont.) | Rehabilitation: Panel Discussion | Meeting of old and new National Executive Committee |
| | | | Informal Dinner | | |
| 8–10 p.m. | Organization of House of Delegates* | | | | |

*Organization of House of Delegates if amendment is passed.

**Open to all interested American Physiotherapy Association members.

### Monday, May 15

**2-5 p.m.**

National Executive Committee Business Meeting.

**8-10 p.m.**

National Executive Committee Business Meeting.

### Tuesday, May 16

**9-12 a.m.**

National Executive Committee Business Meeting.

**2-5 p.m.**

National Executive Committee Business Meeting.

### Wednesday, May 17

**9-12 a.m.**

Registration (Members: $1.00; nonmembers, limited to members of allied organizations and professions: $2.00).

### Wednesday, May 17

**9-12 a.m.**

Physical Therapy School Section.*

Chairman: Gertrude Beard, Northwestern University Medical School.

Participants: Limited to representatives from schools approved by the American Medical Association.

(*A report of this meeting will be given at the Association Business Meeting, Sunday, May 21.)

### Thursday, May 18

**9-12 a.m.**

Chapter Problems Section

Chairman: Mrs. Margery Wagner, National Chapter Relations Chairman.

Open to: Official representatives from Chapters and members of the American Physiotherapy Association.

**12-2 p.m.**

Crippled Children's School Section Luncheon.

**2-5 p.m.**

Infantile Paralysis Round Table.

A discussion of recent developments in the treatment of infantile paralysis with emphasis upon reports from those who have been associated with the work in the 1943 epidemic areas. Problems that have arisen including equipment, recording and teaching will be considered.

Chairman: Lucille Daniels, Assistant Professor, Division of Physical Therapy, Stanford University, California.

"The Incidence of Infantile Paralysis in 1943" by Don W. Gudakunst, M.D., Medical Director, National Foundation for Infantile Paralysis.

"A Recent Tour through 1943 Infantile Paralysis Areas" by Jessie L. Stevenson, Joint Orthopedic Nursing Advisory Service, New York City.

Discussants:

Charlotte Anderson, James Whitcomb Riley Hospital, Indianapolis, Indiana.
Jean L. Collings, Portland, Oregon.
Carolynn A. Davis, Visiting Nurse Association, Chicago, Illinois.
Mary Deatherage, Children's Hospital, Akron, Ohio.
Dorothy Frederickson, Children's Hospital, Boston, Massachusetts.
Janet Merrill, Children's Hospital, Boston, Massachusetts.
Alice Lou Plastridge, Georgia Warm Springs Foundation, Warm Springs, Georgia.
Susan G. Roen, Orthopaedic Hospital, Los Angeles, California.
Louise Suchomel, Visiting Nurse Association, Detroit, Michigan.
Beatrice Vlahos, National Foundation for Infantile Paralysis, New York City.
Jessie Wright, M.D., D. T. Watson School of Physical Therapy, Leetsdale, Pennsylvania.

## PROGRAM ON REHABILITATION

HAZEL E. FURSCOTT, *Chairman*

### *Round Table Discussion of the Integration of All Facilities Essential to a Rehabilitation Program*

**Friday, May 19—ANALYSIS OF EXISTING PLANS**

**9 to 12 a.m.—The American Plan**

Hazel E. Furscott, *Chairman*

The Army—Colonel Leonard T. Peterson
The Army Air Forces—Lieutenant Colonel Howard A. Rusk
The Navy—Commander H. Bruno Arnold
The Veterans' Facilities—Miss Alice Baker
The Federal Security
Federal Program—Mr. Michael J. Shortley
Regional and State—Miss Tracy Copp
The Industrial Program—Mr. Stanwood L. Hanson

**2 to 5 p.m.—The American Plan (continued) and Foreign Plans**

Jessie L. Stevenson, *Chairman*

Crippled Children's Program—Dr. A. L. Van Horn
The National Council on Rehabilitation—Colonel John N. Smith, Jr.
State Councils of Rehabilitation—Miss Bell Greve
Rehabilitation Legislation—Colonel John N. Smith, Jr.
Compensation Laws—Mr. Harry Howett, Mr. W. H. Seymour
The English Plan—Colonel F. S. Gillespie
The Russian Plan—Miss Helen Kaiser
The German Plan—Miss Mildred Elson

**Saturday, May 20—PANEL DISCUSSION 9 to12 a.m.**

Dr. Don W. Gudakunst, *Chairman*

**I. Stages of Rehabilitation**

1. Diagnosis, medical and surgical treatment
2. Before medical and surgical treatment
3. Immediately after medical and surgical treatment
4. Convalescence
5. Vocational training

**II. The Use of the Various Facilities in All Stages of Rehabilitation**

*Key speakers:* Dr. Dean A. Clark
Colonel Leonard T. Peterson

1. Facilities used in various stages of rehabilitation
   a. Surgery, psychiatry, and medicine—Dr. K. G. Hansson, Colonel Leonard T. Peterson
   b. Physical therapy—Major Emma E. Vogel, Mr. Paul Campbell, Lieutenant (j.g.) Dorothy Lovedahl

c. Occupational therapy—Mrs. Winifred C. Kahmann, Mrs. John A. Greene, Miss Elizabeth Martin
d. Curative workshop — Miss Mary Castle, Miss Lucille Daniels
e. Sheltered workshop—Mr. Oliver A. Friedman, Colonel John N. Smith, Jr.
f. Recreational therapy—Miss Mary Castle, Mrs. John A. Greene, Mrs. Winifred C. Kahmann
g. Vocational therapy and training—Lieutenant Colonel Howard A. Rusk

**2 to 5 p.m.—Panel Discussion**
Catherine Worthingham, *Chairman*

**I. Integration of the Use of All Facilities in the Various Stages**

*Key speakers:*
Mr. Basil O'Connor
Dr. Frank H. Krusen
Miss Bell Greve
Colonel Leonard T. Peterson

*Discussants:*
Mr. W. H. Seymour
Mr. Michael J. Shortley
Colonel F. S. Gillespie
Lieutenant Colonel Howard A. Rusk
Mrs. Shirley Capels
Commander H. Bruno Arnold

Participants in the rehabilitation program will be as follows:

Commander H. Bruno Arnold, U. S. Naval Hospital, Brooklyn, N. Y.

Miss Alice Baker, Physical Therapy Supervisor, Veterans' Administration, Washington, D. C.

Mr. S. Paul Campbell, Director, Physical Therapy, Pennsylvania Hospital, Philadelphia, Pa.

Mrs. Shirley Capels, San Francisco, Calif.

Miss Mary Castle, Director, Dept. of Physical Therapy, Rehabilitation Center, Boston

Dean A. Clark, Surgeon (R), USPHS, Chief Medical Officer, Office of Vocational Rehabilitation, Federal Security Agency

Miss Tracy Copp, Regional Representative, Office of Vocational Rehabilitation, Federal Security Agency

Miss Lucille Daniels, Division of Physical Therapy, Stanford University

Miss Mildred Elson, Editor, Physiotherapy Review, American Physiotherapy Association

Mr. Oliver A. Friedman, Executive Secretary, National Association of Goodwill Industries, Inc.

Miss Hazel E. Furscott, Relations Chairman, American Physiotherapy Association, San Francisco, Calif.

Colonel F. S. Gillespie, British Medical Liaison Officer with the United States, Carlisle, Pa.

Mrs. John A. Greene, President, Boston School of Occupational Therapy

Miss Bell Greve, Executive Secretary, The Association for the Crippled and Disabled

Don W. Gudakunst, M.D., Medical Director, National Foundation for Infantile Paralysis

Mr. Stanwood L. Hanson, Assistant Vice-President, Liberty Mutual Insurance Company

K. G. Hansson, M.D., Hospital for Special Surgery, New York City

A. L. Van Horn, M.D., Assistant Director, Children's Bureau, U. S. Dept. of Labor

Mr. Harry Howett, Director, Social Research, National Society for Crippled Children

Mrs. Winifred C. Kahmann, OTR, Supt., Occupational Therapy Branch, Office of the Surgeon General, U. S. Army

Miss Helen Kaiser, Duke University

Frank H. Krusen, M.D., Associate Professor of Physical Medicine, The Mayo Foundation, Director, Baruch Committee on Physical Medicine

Lieutenant (j.g.) Dorothy Lovedahl, U. S. Naval Hospital, St. Albans, New York

Miss Elizabeth Martin, Percy Jones General Hospital, Battle Creek, Mich.

Mr. Basil O'Connor, President, National Foundation for Infantile Paralysis

Colonel Leonard T. Peterson, Director, Orthopedic Surgery, Office of the Surgeon General, U. S. Army

Lieutenant Colonel Howard A. Rusk, Convalescent Training Branch, Army Air Forces

Mr. W. H. Seymour, Vice-President, Liberty Mutual Insurance Company

Mr. Michael J. Shortley, Director, Office of Vocational Rehabilitation, Federal Security Agency

Colonel John N. Smith, Jr., Director, Institute for Crippled and Disabled

Miss Jessie L. Stevenson, Consultant, Orthopedic Nursing, National Organization for Public Health Nursing

Major Emma E. Vogel, Director, Physical Therapy Aides, Office of the Surgeon General, U. S. Army

Miss Catherine Worthingham, Division of Physical Therapy, Stanford University

## Baruch Committee on Physical Medicine

The following release was issued by the Baruch Committee on Physical Medicine—Dr. Ray Lyman Wilbur, Chairman, and Dr. Frank Krusen, Director:

After a scientific exploration of the possibilities of the subject, with special reference to its value in the rehabilitation of the wounded and ill men discharged from the Armies—casualties of the war—Bernard M. Baruch on April 26, 1944, gave the sum of $1,100,000 to be used for the teaching of and research in physical medicine. An Administrative Board, under the Chairmanship of Dr. Ray Lyman Wilbur, Chancellor of Stanford University, has been established to inaugurate the program.

The following institutions are participating:

1. To Columbia University College of Physicians and Surgeons, $400,000 for the establishment of a key center of research and teaching of physical medicine, with particular reference to its application for returning veterans. This sum is to be expended over a ten year period. This center is to give immediate assistance in maintaining an adequate supply of medical specialists to handle the problems of war and post-war physical rehabilitation.

2. To New York University College of Medicine, $250,000 to be spent in ten years in establishing a center for teaching and special research in preventive and manipulative structural mechanics of physical medicine.

3. To the Medical College of Virginia, (from which the late Dr. Simon Baruch, father of Mr. Bernard M. Baruch, graduated in 1862) $250,000 to be expended in ten years in establishing a center for teaching and research with particular reference to hydrology, climatology and spa therapy.

4. To selected medical schools, $100,000 to develop an immediate program for the physical rehabilitation of war casualties and those injured in industry.

5. For the establishment of Fellowships or Residencies, $100,000 to be used for the benefit of qualified physicians or other scientists who are selected to be trained in this field.

Mr. Baruch's gift was animated by the belief that physical medicine has not been given the scientific treatment it deserves. Physical medicine means the treatment of disease by external physical agents including light, water, heat, electricity and other mechanical agents including exercise and massage. Hydrology (the science treating of water, with particular reference to its curative properties); climatology (specifically particular climates to help cure particular ailments); and spa-therapy (the external and internal use of water at a health resort for curative purposes) are included in the subject.

To be sure of the ground which he wished to cover, Mr. Baruch as long ago as last October, asked Dr. Ray Lyman Wilbur, himself a distinguished physician and Chancellor of Stanford University, to act as chairman of a committee for the purpose of determining the soundness of the plan and the best method of approach.

Mr. Baruch, explaining to Doctor Wilbur's committee that they were free to report the truth as they found it, said his interest in the situation had arisen from two causes:

1. Because his father, a distinguished surgeon of the Confederate Army, Dr. Simon Baruch, had been a leader in the field at the College of Physicians and Surgeons, and

2. Because of his (Mr. Baruch's) desire to do something for the sick, especially the ill and wounded veterans.

The Committee after many meetings recommended the grants which were distributed on April 26th.

In making these gifts, the donor, under the guidance of his committee, asked that each of the centers, "Provide itself with an adequate team of workers among whom will be a specialist in clinical physical medicine and appropriately trained and interested laboratory scientists." It is expected that this team will coordinate all work of the centers and gather others in the institution so that an effective group will be developed.

The underlying idea of the gift was expressed in a letter Mr. Baruch wrote to Doctor Wilbur which follows:

October 11, 1943

My dear Doctor Wilbur:

My father, Dr. Simon Baruch, impressed me with the possibilities of physical therapy as a preventive and as a cure for human ills. Later on Doctor James suggested a school for physical therapy to be established which, after study, would cull the best from hydrotherapy, balneology, sun, heat, cold, electricity, air and Swedish therapy, massage, chiropractics, osteopathy, exercise and allied curative means.

I have asked you to serve as Chairman of a Committee to make a survey of the field of physical therapy and make such recommendations as you and your committee think would widen its usefulness. In view of the many wounded, I know you will give special consideration to reconstruction and occupational therapy.

May I suggest also that you give as much thought as you can in consultation with such authorities as Doctor Coolidge, of Schenectady, to the matter of electronics and its possibilities in the field of medicine?

I am pleased that you have associated with you as Vice Chairman, Dr. W. T. Sanger, President of the Medical College of Virginia, from which my father was graduated in 1862 to become a surgeon in the Confederate Army. And Lt. Col. Benjamin A. Strickland, Jr., Army Medical Corps, Davis Monthan Field, Tucson, Arizona.

Dr. Charles F. Behrens, Head of X-Ray Dept., at Naval Medical Center, Bethesda, Maryland.

Dr. Carl R. Comstock, of Saratoga Springs, New York.

Dr. John Coulter, Professor of Physical Therapy and Director of the Physical Therapy Department, Northwestern University Medical School, Chicago, Ill.

Dr. Kristian G. Hansson, Medical Director of the Physical Therapy School at the Hospital for Special Surgery, New York, N. Y.

Dr. Frank Krusen, Professor of Physical Medicine and head of the section on Physical Medicine, Mayo Clinic, Rochester, Minn.

I am deeply grateful to you and your associates for your willingness to accept this worthwhile undertaking.

Sincerely yours,
(SGD) BERNARD M. BARUCH

Dr. Ray Lyman Wilbur, Chancellor
Stanford University
California.

With the Baruch donations and the preparation of its final report, which will be distributed in a few days, the original committee ceases to function. An administrative board has been formed under the chairmanship of Dr. Ray Lyman Wilbur with Dr. Frank H. Krusen as director and the affiliation of Miss Mary A. Boyle, a long time associate of Mr. Baruch. Offices have been established at 597 Madison Avenue, Room 3600, which are in charge of Miss Grace Keefe as executive secretary. A scientific advisory committee and a committee on war and post-war physical rehabilitation are being formed. Dr. Morris Fishbein of the American Medical Association is a member of the Committee on Public Relations, together with Doctor Wilbur, Doctor Coulter, Doctor Krusen, L. C. Salter, and Herbert Bayard Swope.

The committees used to complete the main survey were eight in number. The committees other than the one on Public Relations were as follows:

Subcommittee on Occupational Therapy—Dr. Kristian G. Hansson, Chairman, New York, N. Y.; Mr. Everett S. Elwood, Philadelphia, Pa.; Dr. Robert W. Johnson, Jr., Baltimore, Md.; Dr. Winfred Overholser, Washington, D. C.

Subcommittee on Prevention—Dr. Kristian G. Hansson, Chairman, New York, N. Y.; Dr. Lloyd T. Brown, Boston, Massachusetts; Dr. Frank Ewerhardt, St. Louis, Missouri; Dr. Royal S. Haynes, New York, N. Y.; Dr. William B. Snow, New York, N. Y.

Subcommittee on Hydrology and Health Resorts—Dr. Carl R. Comstock, Chairman, Saratoga Springs, New York; Dr. Robert Leo Bennett, Warm Springs, Georgia; Dr. Victor Diederich, Hot Springs National Park, Arkansas.

Subcommittee on Clinical Research—Dr. John Stanley Coulter, Chairman, Chicago, Ill.; Dr. Frank D. Dickson, Kansas City, Kansas; Dr. George M. Piersol, Philadelphia, Pa.; Dr. Arthur Watkins, Boston, Massachusetts; Miss Catherine Worthingham, Palo Alto, California.

Subcommittee on Rehabilitation — Captain Charles F. Behrens, (MC) USN, Chairman, Bethesda, Md.; Lt. Col. Benjamin A. Strickland, Jr. (MC) USA, Vice Chairman, Tucson, Arizona; Major Walter E. Barton, (MC) USA, Washington, D. C.; Ensign Jane Cassedy, Bethesda, Md.; Lt. Commander Harry Etter (MC) USN, Bethesda, Md.; Major Ora Huddleston, A.U.S, Denver, Colo.; Lt. Commander Robert Kinneman (MC) USNR, Great Lakes, Ill.; Captain Howard Montgomery (MC) USN, Washington, D. C.; Lt. Col. Howard A. Rusk, (MC) USA, Washington, D. C.

Subcommittee on Basic Research — Dr. William T. Sanger, Chairman, Richmond, Va.; Dr. Detlev W. Bronk, Philadelphia, Pa.; Dr. Alan Gregg, New York, N. Y.; Dr. Andrew C. Ivy, Chicago, Ill.; Dr. Eugene Landis, Boston, Massachusetts.

Subcommittee on Teaching — Dr. Frank H. Krusen, Chairman, Rochester, Minnesota; Dr. Robin Buerki, Philadelphia, Pa.; Mr. Howard Carter, Chicago, Ill.; Dr. Frances A. Hellebrandt, Madison, Wis.; Dr. Ernest Jaqua, Washington, D. C.

The actual survey began on November 1st, and was completed by February 1st. Since then the details have been put into execution. The costs of the preliminary explorations were borne by Mr. Baruch in addition to the $1,100,000 he is devoting to its main purposes.

This committee found that the three primary needs for the proper development of physical medicine were:

1. An adequate supply of physicians who could teach physical medicine.

2. More basic research in physical medicine, including establishment of centers to promote carefully checked scientific research on commonly accepted nonmedical procedures, including those for which claims have been made by practitioners of osteopathy, chiropractic, etc.

3. Proper usage of physical medicine in relation to wartime rehabilitation.

It is to meet these needs that the program of benefactions was devised by Mr. Baruch.

(Note: A full report of the Baruch Committee on Physical Medicine is available, and copies can be obtained, free of charge, by writing to the Baruch Committee on Physical Medicine, Room 3600, 597 Madison Ave., New York 22, N. Y.)

## The Story of the Kenny Method

Just three and a half years ago—in 1940—a distinct change in our treatment of infantile paralysis was introduced, one that has since caught the public's attention because of its human drama. This, of course, was the method of treating infantile paralysis victims which was evolved by Sister Kenny, the Australian nurse.

Many have misunderstood the nature of the Kenny treatment and have thought it a cure for infantile paralysis. That is not true, and Sister Kenny makes no such claim. There is no cure for this crippling disease. The medical profession is still in the dark as to how to prevent it. It cannot control its spread. No one yet knows by what method this virus is carried from one victim to another. In a day when we are masters of malaria, smallpox, and diphtheria—infantile paralysis is still a riddle, a mystery, a crippling menace prowling our country at will.

What Sister Kenny has contributed, however—and it is a very real contribution—is a method for treating victims already stricken by infantile paralysis; a method that in the opinion of many American physicians reduces the crippling aftereffects of the disease.

There is a real interest in the history of the Kenny method in this country, and The National Foundation for Infantile Paralysis played an all-important part in evaluating this technic and in making it available to every infantile paralysis victim.

Sister Kenny went to the offices of the National Foundation one day in May 1940, because she knew that the job of the National Foundation was to examine and study every new bit of knowledge that could possibly hasten the conquest of infantile paralysis. Present that day were Sister Kenny, the President of the National Foundation and its Medical Director. Sister Kenny told how she had first developed her method. Thirty years ago, as a young nurse in the Australian bush country, without medical assistance, she had to care for a child stricken with infantile paralysis. Instead of immobilizing her patient's paralyzed limbs in casts or splints, she worked out a method of easing the pain and tightness in the muscles by frequent applications of heat—strips of woolen material were wrung out of steaming hot water. As the pain subsided she followed this with passive exercise until the patient himself could move his limbs. She felt that in many cases, this treatment had prevented many of the crippling after-effects of the disease.

Sister Kenny was anxious that the National Foundation subject her method to scientific check, and so was the National Foundation. A few weeks later, when the University of Minnesota asked the National Foundation to support a program to study the Kenny method, it readily made a grant to that institution to enable Sister Kenny to demonstrate her method and to give the physicians at Minneapolis a chance to see her work. For the next six or seven months Sister Kenny treated infantile paralysis patients in Minneapolis.

In January of 1941, the National Foundation received a preliminary report from the physicians at the university. They were strongly impressed by what they had seen. To be sure the number of cases studied had been few—too few to justify definite conclusions, but the physicians supervising this study felt that the patients treated had made far better recoveries than was usual in their experience. They recommended further study.

There was one fact, not widely known, that made these physicians cautious in their judgment. And that was the fact that over 50 per cent of all infantile paralysis cases seemingly recover by themselves, without any special form of treatment! "How do we know," these physicians asked, "that many of these cases Sister Kenny has treated might not have been among those that would have recovered spontaneously?" Obviously no one could answer that question, but medical science and the National Foundation had to take that factor into account.

The caution of these physicians making their first study of the Kenny method was justified on other grounds, too. They had seen many hopeful methods for treating infantile paralysis tried before—methods which failed to stand up under scientific test. Before they gave the Kenny method their full approval, they had to be sure.

That is why in 1941, the National Foundation

made a second grant to the University of Minnesota to make further studies of the Kenny method. Nearly one hundred patients were treated the following year. In December of 1941 the medical men of the university made a second report. After consideration of this report, the Medical Advisory Committee of the National Foundation declared:

"It is the opinion of this committee that during the early stages of infantile paralysis the length of time during which pain and tenderness are present is greatly reduced, and contractures caused by muscle shortening during this period are prevented by the Kenny method. The general physical condition of the patient receiving this treatment," said the committee, "seems to be better than that of patients treated by some of the other methods during a comparable period."

It was on the basis of this report that The National Foundation for Infantile Paralysis felt justified in opening the throttle and going full steam ahead to make this Kenny method of treating infantile paralysis available everywhere in the land. A plan was immediately set up to instruct and train physicians, nurses and physical therapy technicians. Sister Kenny herself was to help in the teaching at the University of Minnesota.

How well this has worked was clearly demonstrated during the epidemics of 1943 when 12,401 cases were reported. The physicians of the whole nation had learned something of the work; many were intimately acquainted with it. Physical therapy technicians and nurses had been trained to do the work. From the epidemic areas of the West, the Central States and the East came a flood of requests from physicians for more technicians and more nurses to give this treatment.

Here was proof of the endorsement of the method by American medicine! Patients could be treated from coast to coast. Private physicians, clinics, hospitals and departments of health called for more skilled workers. The supply was limited by the demands placed on this country by war; yet there were enough to do a good job.

Up to the present time, a total of 900 persons have received this training at the University of Minnesota alone, and have been graduated with the approval and certification of Sister Kenny.

All of this has been tremendously costly—a cost borne entirely by the National Foundation. To date, $107,000 has been given by the National Foundation to the University of Minnesota alone, to further the evaluation and teaching of the Kenny method. Every sum this university has ever requested has been granted in full by the National Foundation.

But the task of teaching the number of technicians needed to serve the whole country was too great for any one school. So the National Foundation opened other centers. Institutions in California, Illinois, Indiana, Georgia, Pennsylvania and New York took up the teaching of the Kenny method. In addition to the money given to the University of Minnesota, $140,000 has been granted to the other schools. These grants were made to schools connected with or operated by medical teaching centers. Eight medical colleges and one hospital devoted solely to treating infantile paralysis and to training professional people took up the burden of making the special skills and knowledge available to all physicians, nurses and physical therapy technicians. There was no quarrel here between American medicine and new methods of alleviating suffering and crippling from infantile paralysis!

The National Foundation has spent additional money on scholarships, wool for treatment, distribution of literature, exhibits and demonstrations—a total of $301,000!

In addition to all of the foregoing, two five-year grants have been made recently by your National Foundation: one for $175,000 to the University of Minnesota to study the physiological problems concerning the mechanism of infantile paralysis and methods of treatment; the other grant of $150,000 was made to the University of Pennsylvania to establish a center for research and instruction in physical medicine. Both of these grants permit further evaluation and teaching of the Kenny method.

It is the dimes and dollars of the American people that have made this possible—the dimes and dollars they have contributed each year to the March of Dimes. And those dimes have done good work. Last year, the third greatest epidemic in the recorded history of the disease in the United States struck our country. Had it not been for the hundreds of physicians, nurses and technicians trained with the public's money and ready to administer the Kenny method promptly, that epidemic might have resulted in a national disaster.

It is obvious, of course, that this newer type of treatment is far more costly, in money and personnel, than the older systems of handling poliomyelitis victims. Heretofore, patients were usually immobilized in splints and plaster casts and could be cared for by a small staff of physicians, nurses and technicians. The physical therapy given usually consisted of a few hours

of treatment a week—and that frequently was administered only late in the disease.

With the Kenny method, all that is different. Our medical men, in their own language, describe the Kenny method this way—"It is the early use of physical therapy, designed to prevent unnecessary deformities and to bring about the maximum function of such nerves and muscles as may have been spared by the disease process."

How such treatment methods can be best taught and made available to the people is a matter about which there is a difference of opinion. The establishment of a Kenny institute in Minneapolis as the only place where the Kenny method would be taught has been suggested. But, of course, it's impossible to train all the Kenny technicians we require at any one place—in Minneapolis or elsewhere. And it would be equally impossible for any one person to supervise the various centers of teaching now supported by The National Foundation for Infantile Paralysis.

The ultimate aim is to make whatever is sound in the Kenny method a part of the curriculum of every medical, nursing and physical therapy school in the country—and that aim will be accomplished. No one institution can have a monopoly on the teaching of the Kenny method. While it is Sister Kenny's contribution to humanity, for humanity's sake it must be available to all.

This history of the Kenny method shows very clearly that your National Foundation stands ready to evaluate and test and make available every method of treatment that promises to loosen the grip that infantile paralysis has on our children. If, on the basis of tests made, a method is found effective, the full resources of The National Foundation for Infantile Paralysis will be thrown behind it. The half million dollars spent on the Kenny method to date certainly proves that.

The National Foundation for Infantile Paralysis is dedicated to one purpose and one purpose only—final and complete conquest of infantile paralysis.

Until that conquest is made, the National Foundation will carry on the most ambitious research program ever marshalled against any disease. It also will continue to provide hospitalization and medical care, including the Kenny treatment, in every community to every infantile paralysis victim who needs it. And it will continue to evaluate and aid every new method that is brought to its attention.

It is the people of America who have made all that possible!

## Army Promotions

The Surgeon General of the Army announces the following promotions of Medical Department Physical Therapy Aides to the grade of First Lieutenant:

| *Name* | *Present Station* |
|---|---|
| Ellinger, Ruth | McCaw General Hospital, Walla Walla, Wash. |
| Hutchison, Louise | Station Hospital, Indiantown Gap, Pa. |
| Sommer, Doris | Station Hospital, Cp. Swift, Tex. |
| Brown, Myrtle | Station Hospital, Maxwell Field, Ala. |
| Anderson, Vallie | Station Hospital, Fort Story, Va. |
| Doyle, Frances | Station Hospital, Camp Campbell, Ky. |
| Green, Fern | Brooke General Hospital, Fort Sam Houston, Tex. |
| Harmon, Georgianna | Station Hospital, Camp Howze, Tex. |
| Freeman, Muriel | Station Hospital, Fort Knox, Ky. |
| Dixon, Routh | Finney General Hospital, Thomasville, Ga. |
| Towry, Bernice | Station Hospital, Camp Gruber, Okla. |
| Stange, Carol | Lawson General Hospital, Atlanta, Ga. |
| Meyer, Harriet | Overseas. |
| Rich, Janet | Overseas. |
| Schmidt, Edna | Overseas. |

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The following letter was received from Lt. Jane Ewing, who is serving with the armed forces overseas:

June 8, 1943

The past year has certainly been a busy one, but a difficult one to report on. We have experienced so much that was new and confusing that it has been a case of not being able to see the forest for the trees. The actual practice of physical therapy has been the least trying of all the things I have had to do.

At our first location when we were building a hospital, literally from the ground up, the physical therapy department was a very makeshift affair. I worked in one end of a warehouse that was being used as the surgical ward. This niche was necessitated by the fact that only there was there an electric current available upon which we could use our American-made bakers—our only method of giving heat. Hot water would have been available only by digging a hole in the ground, building a fire in it and putting a G.I. can on to boil—a matter of several hours. I

wanted to try that, but electricity, uncertain as it was, was the better thing.

Soo-o if there was not an operation being performed behind the tarpaulin that served to create an operating room out of one end of the warehouse, if no one wanted to use the sterilizer, if the motor was not "on the fritz" or the electrician having his day off, all I had to do was run down around the end of the building and have the electrician start the portable generator and while it heaved and clacked some unfortunate sacro-iliac or fractured ankle received its prescribed baking.

On more than one morning I went to work to find the physical therapy department space and bed occupied by an overflow from the ward, in which circumstances the department was discontinued until further notice.

With the removal of patients from warehouses and tents into the permanent hospital building the department sustained an advancement. There was one critical week when it looked as if they were going to leave physical therapy in the warehouse, move medical supplies in around it and forget the whole business, but at the last possible minute they crashed through with two beds and a private circuit on an outdoor veranda. The difficulty about electricity is that all local lines and generators put out a current of 220 volts, which is ruinous to U. S.-made electrical equipment; hence we either had to install transformers or connect our equipment in series which automatically reduced by half the amount of voltage going into any one piece.

This new and expanded department had great scenic virtues and plenty of fresh air. It was the A-1 sideshow for the native boys who hung over the railing and gazed in solemn awe and admiration at the work we did. I might have been more flattered had they not accorded the same intense interest to a game of checkers or a man cleaning his teeth! However, I must confess that the interest was not one-sided; when they were not looking at me I was watching them. They have the most magnificent physiques and beautiful foot action I have ever seen.

Things went along very comfortably in this open-air shop. We were out of the theater of operations and our casualties were those that naturally occur in the ordinary routine of living in the field. One thing that caused a great many accidents was that the boys had taken to riding horses for recreation. A lot of would-be cowboys mounted on wild ponies without saddles came to grief and required a lot of patching!

Finally in November we received a boat load of casualties from the battles—soldiers, sailors and marines. That is a time that none of us will ever forget, and then and for two months thereafter we were busy, doing the kind of work that we had come out to do.

In February we were moved to another location. We hated leaving the hospital which we had built and the beauty of our surroundings there. The hardships had been many in the beginning but we had such a personal interest in the place that it truly seemed like home.

Here we returned to civilization, moved into a better hospital set-up and physical therapy advanced again, this time getting inside the building. The volume of work had increased sufficiently for me to have an assistant, Sam Cohen, late of the Belvedere Hotel in Baltimore, and it was not long before we had our new quarters more snugly outfitted than a ship's galley. Given a room 12 by 24 ft., put into it three treatment tables, five bakers, a hydrotherapy section, a gymnasium and a dressing room and if you don't have to hang part of it from the ceiling—well, anyway, we did!

One of our doctors devised a weight and pulley arrangement for the "white" bakers that permits them to hang from the ceiling and be pulled down over the patient, when needed. When not in use you simply push them up, and they (usually) stay there, out of the way.

Another group of three pulleys, two overhead and one on the floor together with a weight bag, provides exercise for either shoulder or knee according to the way you hitch it up and takes up no space when not in use. Finger steps are attached to the wall, and jumping ropes, wooden wands and other portable aids for exercise can be used outside the department once the patient has been adequately instructed.

Hydrotherapy is a built-in zinc tank in one corner with hot and cold running water. It is low to the floor so that a patient can sit on a chair for a foot or ankle soak, and we get contrast baths by using a pail of cold water beside it. An oblong granite dish pan on a shelf suitable to the height of a sitting patient provides hot baths for hands, forearms and elbows.

The electrotherapy department, a galvanic-faradic generator, is under a treatment table when not in use and anywhere that offers an available spot when we are treating a patient with it.

The dressing room is a folding screen that collapses against the wall when there is no one in it—and sometimes when there is.

Foot exercises are performed in a narrow neck of land extending beneath the windows from hydrotherapy to my desk—an x-ray equipment

packing box.

The past three months have seen a marked reduction of surgical and orthopedic cases. Our bed capacity is full and the patients are certainly war casualties, but most of them are medical rather than surgical—the result being that physical therapy consists largely of treating bad backs and arthritic joints of which people seem to develop an amazing number.

## WAC Training

In accordance with a letter published on December 14, 1943, by the Adjutant General of the Army, women may now be recruited for enlistment in the Women's Army Corps in order to attend one of the courses in physical therapy offered by the Medical Department of the Army.

The Surgeon General will review the applicant's educational and physical qualifications to determine her eligibility for this training prior to final acceptance into the Women's Army Corps.

Further information regarding this program may be obtained from local WAC Recruiting Officer or from the Physical Therapy Section in the Office of The Surgeon General, Washington, D. C.

## Federal Security Agency

The following release was cleared and issued through facilities of the Office of War Information:

Physical restoration for the handicapped, so that they may as nearly as possible approximate normal capacity, was called the basic need in vocational rehabilitation by Federal Security Administrator Paul V. McNutt at the first meeting of the Professional Advisory Committee of the Office of Vocational Rehabilitation held in Washington, Friday, March 3.

The committee, made up of 20 specialists in medical and allied fields, was appointed by Administrator McNutt to provide professional guidance in mapping the new State-Federal program for medical and surgical care under the Barden-LaFollette Act.

In opening the meeting, Mr. McNutt stressed the Federal Security Agency's desire to aid the States in providing physical restoration services which will conform to the high professional standards recognized by the national and State medical associations and by the hospital associations.

"To be able to count on themselves as workers," Mr. McNutt continued, "many of the disabled need more than vocational training, important as that is. They need medical care to restore as much physical capacity as possible. Doctors have long pointed out that tackling the complex problem of rehabilitation at any other point is putting the cart before the horse. Some of the States, too, have pioneered in providing for physical restoration, along with vocational training, for the handicapped. This service has now been recognized as an integral part of our national vocational rehabilitation program.

"We want to give the disabled—the men and women crippled in industry, or by accident or illness—a chance to fulfill their rights and duties as citizens and as self-supporting wage-earners. We want to do this because it is in line with the American way of looking out for ourselves. We want to do it now because war industry needs every hand that can help."

An estimated million and one-half persons may be eligible for rehabilitation under the program authorized by enactment of the Barden-LaFollette Bill last summer, according to Michael J. Shortley, Director, Office of Vocational Rehabilitation.

Reporting the total active case load as 91,000 for the current year, Mr. Shortley said: "The States indicate they will extend rehabilitation services to 110,000 disabled persons during the fiscal year 1945." The program is in operation in all 48 States, the District of Columbia, Hawaii and Puerto Rico. "Physical restoration rounds out vocational rehabilitation services. It gives us the chance," he said, "to do more things for more people."

Plans for organization were brought to the committee by Dr. Dean A. Clark, of the U. S. Public Health Service, who is Chief Medical Officer for the OVR. The committee is making recommendations for the advice of State Rehabilitation Agencies in the following areas of operation: the scope of physical restoration services; professional standards for physicians, hospitals and other facilities providing services under State programs; auxiliary services in the fields of medical-social work, nursing, psychiatric social work, and physical therapy; and definition of the policies and plans of various groups of disabilities.

Members of the committee represent the professional specialties most actively concerned in rehabilitation. They are as follows:

Rev. John W. Barrett, Chicago, Director of Catholic Hospitals, Archdiocese of Chicago

Miss Harriet Bartlett, Boston, President, American Association of Medical Social Workers

Dr. E. M. Bluestone, New York, Director, Montefiore Hospital

Dr. Karl M. Bowman, San Francisco, President-Elect, American Psychiatric Association
Dr. Roderick Brown, Pittsburgh, Tuberculosis Specialist
Dr. Guy A. Caldwell, New Orleans, Secretary, American Board of Orthopedic Surgery
Dr. John S. Coulter, Chicago, Member, Council on Physical Therapy, American Medical Association
Dr. Purman Dorman, Seattle, Ophthalmologist
Dr. Robert Elman, St. Louis, Associate Professor of Clinical Surgery, Washington University School of Medicine
Miss Marjorie Fish, New York, in charge, Professional Courses in Occupational Therapy, Columbia University
Lt. Col. Raymond Hussey, M.C., A.U.S., Baltimore, Director, Army Industrial Hygiene Laboratory
Dr. Victor Johnson, Chicago, Secretary, Council on Medical Education and Hospitals, American Medical Association
Dr. E. S. Mariette, Minneapolis, Medical Director and Superintendent, Glen Lake Sanatorium
Dr. Horace Newhart, Minneapolis, Professor Emeritus of Otology, Rhinology, Laryngology, University of Minnesota Medical School
Dr. Winthrop M. Phelps, Baltimore, Orthopedic Surgeon
Miss Marian Randall, Washington, D. C., Chief Nurse, Medical Division, Office of Civilian Defense
Dr. W. D. Stroud, Philadelphia, Member, Council on Industrial Health, American Medical Association
Dr. V. P. W. Sydenstricker, Augusta, Ga., Professor of Medicine, University of Georgia School of Medicine
Dr. H. A. Vonachen, Peoria, Medical Director, Caterpillar Tractor Co.
Frank J. Walter, Denver, President, American Hospital Association

Also attending by invitation were these members of the Rehabilitation Advisory Council:

Dr. Kendall Emerson, New York, Managing Director, National Tuberculosis Association
Dr. Carl M. Peterson, Chicago, Secretary, Council on Industrial Health, American Medical Association
Dr. Donald C. Smelzer, Philadelphia, President-Elect, American Hospital Association
Dr. George Stevenson, New York, Medical Director, National Committee for Mental Hygiene
Miss Catherine Worthingham, Palo Alto, President, American Physiotherapy Association

## New Members

The following are new members of the American Physiotherapy Association whose applications were approved on January 24, 1944 (all provisional members unless otherwise noted):

Aushman, Ruth, 42 E. Superior St., Chicago 11, Ill.
Barnes, Mary, 1008 W. 19th Ave., Spokane, Wash.
Brink, Barbara, 309 Edgemoor Ave., Kalamazoo, Mich.
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Shipley, Florence, Winter General Hospital, Topeka, Kansas.
Sillery, Lt. Marguerite, Station Hospital, Fort Dix, N. J.
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## Beveridge H. Moore

Dr. Beveridge H. Moore, Chief Surgeon at the Chicago Shriners' Hospital, and Associate Professor of Bone and Joint Surgery at Northwestern University Medical School, died on February 29, 1944, at his home in Chicago. Doctor Moore was Acting President of the Chicago Orthopedic Society, a member of the American Orthopedic Association, the American Academy of Orthopedic Surgeons, the Chicago Literary Club and the American Association for the Advancement of Science. He also served as Attending Orthopedic Surgeon at the Cook County, Children's Memorial and Illinois Central Hospitals.

A 1912 graduate of Rush Medical College, he served in France in the first World War as a Major in the Medical Corps in Hospital Unit No. 24.

During the eighteen years Doctor Moore was connected with Shriners' Hospital he endeared himself to hundreds of children through untiring service and skillful surgery. As an associate member of the Illinois Chapter of the American Physiotherapy Association, and a frequent speaker at the meetings, Doctor Moore gave generously of his experience and fund of knowledge.

The Illinois Chapter extends heartfelt sympathy to Mrs. Moore and her two sons, and they will long remember Doctor Moore for his kindliness and his services for crippled children.

## Pennsylvania Physiotherapy Association, Inc.

Mrs. Ida K. Meyer, after a short illness, died on December 4, 1943. She was one of the founders of the Pennsylvania Physiotherapy Association, Inc., and was one of the teachers at the Philadelphia Orthopaedic Hospital and Infirmary for Nervous Diseases in their School of Massage and Applied Branches. Her main interest was poliomyelitis work. She retired from teaching in 1930, but kept up her interest in the association, watching the new methods with keen interest and helping many that could not get assistance through regular channels.

## Western New York Chapter

The Western New York Chapter held a meeting at the Lenox Hotel in Buffalo, New York, on March 11, 1944. The speakers and their topics

were as follows: Mrs. Eloise Landis—"Physical Therapy," Ruth Palmer—"Dietetics," Jean Marks—"Medical Libraries," Wilma Roehle—"Medical Technology," Mrs. Tessa Klein—"Visiting Nurses," and Mr. Carl Burkhardt—"Physical Education." The meeting was unusually fine since the speakers very cleverly told of the activities of their own organizations. During war it is especially important and of great interest to know of the changes taking place in other professional groups.

## Northwestern University Medical School

Graduation exercises for the 19th class of the Physical Therapy Course at Northwestern University Medical School were held March 22, 1944. The address to the graduating class was given by Colonel Don Hildrup, Surgeon of the Sixth Service Command. A service flag given to the Alumni Association by Mrs. John S. Coulter was dedicated in honor of the fifty graduates serving in the armed forces. Following these exercises the graduating class was entertained by the Alumni Association at a dinner at Normandy House, with Dr. John S. Coulter acting as toastmaster.

## American Congress of Physical Therapy

The American Congress of Physical Therapy will hold its twenty-third annual scientific and clinical session September 6, 7, 8 and 9, 1944, inclusive, at the Hotel Statler, Cleveland, Ohio. Rehabilitation is in the spotlight today—physical therapy plays an important part in this work. The annual instruction course will be held from 8:00 to 10:30 A. M., and from 1:00 to 2:00 P. M. during the days of September 6, 7 and 8. The scientific and clinical sessions will be given on the remaining portions of these days and evenings. All of these sessions will be open to the members of the regular medical profession and their qualified aids. For information concerning the instruction course and program of the convention proper, address the American Congress of Physical Therapy, 30 North Michigan Avenue, Chicago 2, Illinois.

## Nurses' Convention

This biennial convention year the American Nurses' Association, the National League of Nursing Education and the National Organization for Public Health Nursing are holding meetings jointly in Buffalo, New York, with headquarters hotels designated as follows: ANA — Hotel Statler; NLNE — Hotel Lafayette; NOPHN—Hotel Buffalo. Dates set for the meetings are June 5, 6, 7 and 8, 1944.

Two joint evening sessions are planned at which will be presented the programs of the National Nursing Council for War Service, the Nurse Education Division of the U. S. Public Health Service, the Procurement and Assignment Service for Nurses and the American Red Cross Nursing Service.

## Mississippi Valley Medical Society

The April issue of the MISSISSIPPI VALLEY MEDICAL JOURNAL (Quincy, Ill.) is devoted entirely to "Medicine and the War," and contains the papers read at a symposium of this title given at the Ninth Annual Meeting of the Mississippi Valley Medical Society last fall.

## War Conference

The Second "War Conference" of industrial physicians, industrial hygienists and industrial nurses was held in St. Louis, Missouri, May 8-14, 1944, at the Hotel Jefferson. The participating organizations were (1) American Association of Industrial Physicians and Surgeons, (2) American Industrial Hygiene Association, (3) National Conference of Governmental Industrial Hygienists, and (4) American Association of Industrial Nurses; and there was a week-long program of joint and separate meetings.

## Wanted: Back Issues

If anyone has unwanted copies of the following issues of the REVIEW, it will be greatly appreciated if they are sent to THE PHYSIOTHERAPY REVIEW, c/o Mrs. Helen Eckersley, 4741 N. Paulina St., Chicago 40, Ill.

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*The Guillotine Amputation.* MAJOR GEN. NORMAN T. KIRK, U.S.A., and LIEUT. COL. F. M. MCKEEVER, M.C., A.U.S. J.A.M.A., April 8, 1944.

*Pain After Amputation and Its Treatment.* COMDR. J. C. WHITE (M.C.) U.S.N.R. J.A.M.A., April 8, 1944.

*Amputation Stump from the Prosthetic Point of View.* MAJOR V. P. THOMPSON, M.C., A.U.S. J.A.M.A., April 8, 1944.

*Temporary Prostheses.* LIEUT. COL. T. CAMPBELL THOMPSON, M.C., A.U.S. J.A.M.A., April 8, 1944.

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### Anterior Poliomyelitis

*Combating Epidemics of Poliomyelitis.* A. L. VAN HORN, M.D., and A. J. LESSER, M.D. The Child, April 1944.

*Diet and Poliomyelitis.* Editorials, J.A.M.A., April 1, 1944.

### Arthritis and Rheumatism

*Rehabilitation in Rheumatism.* C. B. HEALD, M.D. Practitioner, January 1944.

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### Cardiac Conditions

*Hereditary Susceptibility in Rheumatic Fever: The Potential Rheumatic Family.* MAY G. WILSON, M.D. J.A.M.A., April 22, 1944.

*Care of Children with Rheumatic Fever.* BETTY HUSE, M.D. J. Except. Children, April 1944.

### Cerebral Palsy

*Equipment for the Cerebral Palsy Child.* ELEANOR FARRELL. The Spastic Review, March 1944.

### Dermatology

*Management of Skin Problems in Industry.* RUTH G. CANNING. Public Health Nursing, April 1944.

*Generalized Exfoliative Dermatitis Due to Sulfadiazine.* R. D. JOHNSON, M.D. J.A.M.A., April 1, 1944.

*Inflammatory Disorders of the Skin of the Feet.* JOHN F. MADDEN, M.D. J.A.M.A., March 18, 1944.

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*Diathermy in Protracted (Unresolved) Pneumonia.* EVERILL W. FOWLKS, M.D. Arch. P. T., March 1944.

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*Electric Shock Therapy: Report from 100 private cases.* N. K. RICKLES, M.D. Northwest Medicine, Feb. 1944.

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*The EEG. in Late Post-Traumatic Cases.* MILTON GREENBLATT, M.D. Amer. J. Psychiatry, Nov. 1943.

### Foot Conditions

*Frostbite, Immersion Foot, and Allied Conditions.* The Army Med. Bulletin, Jan. 1944.

*A Case of March Fracture Occurring in Civilian Practice.* PAUL H. HARMON, M.D. Guthrie Clinic Bulletin, Jan. 1944.

*Inflammatory Disorders of the Skin of the Feet.* JOHN F. MADDEN, M.D. J.A.M.A., March 18, 1944.

*Cutaneous Manifestations of the Circulatory Disorders of the Foot.* RUBEN NOMLAND, M.D. J.A.M.A., March 18, 1944.

*Fungous Infections of the Foot.* MARCUS RAYNER CARO, M.D. J.A.M.A., March 18, 1944.

*Common Hyperkeratotic Lesions of the Foot.* ROYAL M. MONTGOMERY, M.D., and ANDREW H. MONTGOMERY, M.D. J.A.M.A., March 18, 1944.

*Benign and Malignant Tumors of the Foot.* GEORGE V. KULCHAR, M.D. J.A.M.A., March 18, 1944.

### Heat and Cold

*Frostbite, Immersion Foot, and Allied Conditions.* Army Med. Bulletin, January 1944.

*Some Uses for Dry Cold Therapy, and a Proposed Cooling Cabinet.* W. G. BIGELOW, CAPT., R.C.A.M.C., and E. C. G. LANYON, CAPT., R.E. Brit. Med. J., Feb. 12, 1944.

*Refrigeration Anesthesia in Surgery.* VICTOR RICHARDS, M.D. Annals of Surgery, Feb. 1944.

*Frostbite.* MAJOR CHARLES W. BANKERT (M.C.) A.U.S. Arch. P. T., March 1944.

*Cerebellar Syndrome Following Heat Stroke.* WALTER FREEMAN, M.D., Ph.D., and EDITH DUNOFF, M.D. Arch. Neurology and Psychiatry, Jan. 1944.

### Hydrotherapy

*American Health Resorts: Underwater Therapy as Spas.* LIEUT. COL. EUCLID M. SMITH, M.C., A.U.S., and BILLIE LOUISE CROOK, M. Ed. J.A.M.A., Feb. 19, 1944.

*American Health Resorts: Thalassotherapy.* CHARLES I. SINGER, M.D., and KENNETH PHILLIPS, M.D. J.A.M.A., April 15, 1944.

### Hyperpyrexia

*The Treatment of Resistant Gonorrhea with Induced Hyperthermia Supplemented by Sulfonamide Therapy.* JOHN H. HARRISON, MAJOR, M.C., THOMAS W. BOTSFORD, MAJOR, M.C., and FREDERICK P. ROSS, CAPT., M.C. J. Urology, Feb. 1944.

*Fever as an Adjuvant to Specific Therapy in Syphilis.* EVAN W. THOMAS, M.D. N. Y. State J. Med., Jan. 15, 1944.

*Reduction of Manpower Loss From Gonorrheal Urethritis by Early Application of Fever-Thermotherapy.* LIEUT. COMDR. KENNETH PHILLIPS (M.C.), U.S.N.R.

and ENSIGN ALICE B. MUNDORFF (N.C.), U.S.N.R. Arch. P. T., March 1944.

*Some Complications of Therapeutic Hyperpyrexia.* LIEUT. COMDR. HARRY S. ETTER (M.C.), U.S.N. Arch. P. T., March 1944.

### Miscellaneous

*Treatment of Sciatica.* Brit. Med. J., Jan. 1, 1944.

*Double Beam Cathode-Ray Oscilloscope.* G. E. DONOVAN. Brit. J. Phys. Med. and Industrial Hygiene, Nov.-Dec. 1943.

*The Production by Moderate Exercise of a High Incidence of Bends.* CAPT. COSMO G. MACKENZIE, A.U.S., and LIEUT. AUSTIN H. RIESEN, A.C., A.U.S. J.A.M.A., Feb. 19, 1944.

*Hemostatic Adjustments After Exercise: (1) Acid-Base Equilibrium of the Blood.* NATHAN W. SHOCK. J. General Physiology, Jan. 20, 1944.

*Dolorimetry: A Quantitative Method of Measuring Pain and Deep Sensibility.* L. J. B. CLUZEK, M.D. Ohio State Med. J., Jan. 1944.

*The Patient Comes Out of His Cast.* CARMELITA CALDERWOOD, R.N. Amer. J. Nursing, March 1944.

*Public Health Nurse in the Education of the Handicapped Child.* MARY E. EMBERTON. J. Except. Children, April 1944.

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*Treatment of Facial Palsy.* Brit. Med. J., Jan. 15, 1944.

*A Procedure to Correct Facial Paralysis.* EDWARD M. HANRAHAN, M.D., and WALTER E. DANDY, M.D. J.A.M.A., April 8, 1944.

*Nerve Fiber Counts and Muscle Tension After Nerve Regeneration in the Rat.* PAUL WEISS and C. J. CAMPBELL. Amer. J. Physiology, Feb. 1, 1944.

*Combined Convulsive Therapy and Psychotherapy of the Neuroses.* JOHN D. MORIARTY, M.D., and ANDRE A. WEIL, M.D. Arch. Neurology and Psychiatry, Dec. 1943.

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*Occupational Therapy Work at a Navy Mobile Hospital.* CHAPLAIN LESLIE O'CONNOR, Lt. (j.g.) U.S.N.R. Occup. Therapy and Rehabil., Feb. 1944.

### Peripheral Vascular Diseases

*Prevention of Venous Thrombosis.* Current Comment, J.A.M.A., March 18, 1944.

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*The Physical Fitness of Army Fliers.* PETER V. KARPOVICH. J. Health and Phys. Educ., March 1944.

*Physical Culture in the Soviet Union.* Canadian Hospital, Feb. 1944.

*Body Mechanics and Industry.* W. N. LEAK, M.A., M.D. Brit. J. Phys. Med. and Industrial Hygiene, Nov.-Dec. 1943.

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*Diploma in Physical Medicine: Regulations by English Conjoint Board.* Brit. Med. J., Feb. 12, 1944.

*Physiotherapy in the Middle East (Concluded).* ST. J. D. BUXTON, F.R.C.S. J. Chart. Soc. Physiotherapy, March 1944.

*The Status of the Physiotherapist.* JAMES CYRIAX, M.D. J. Chart. Soc. Physiotherapy, March 1944.

### Rehabilitation

*Rehabilitation in Rheumatism.* C. B. HEALD, M.D. Practitioner, Jan. 1944.

*War Casualties and Industrial Rehabilitation.* Miss. Valley Med. J., April 1944.

*The Place of Physical Education in Rehabilitation.* PAUL ROLAND, Occup. Therapy and Rehabilitation, Feb. 1944.

# ABSTRACTS

**John S. Coulter, M.D.**

### Effect of Kenny Fomentation on the Strength of Voluntary Muscular Contraction in Man

V. E. Hall, M.D., H. M. Schamp, Ph.D., G. E. Brown, M.A., and M. N. Davis, B.S., R.N. From the Department of Physiology, Stanford University, Stanford University, California. In ARCHIVES OF PHYSICAL THERAPY, 25:2:99, February 1944.

There is considerable clinical evidence that the application of moist heat, as practiced in the Kenny treatment for the acute stage of poliomyelitis, decreases the muscle spasm characteristic of that disease. A reduction in the electrical activity of affected muscles following prolonged Kenny treatment has been reported by Schwartz and Bouman. Little is known, however, concerning the extent of relaxation or the duration of treatment required to produce it.

Since the muscle spasm of poliomyelitis is relaxed temporarily by spinal anesthesia, it is a tetanus caused by excessive repetitive discharge of lower motor neurons. One possible mechanism whereby hot applications to the skin surface could relax spasm would be by exciting warm receptors in the skin, sensory impulses from which might reflexly inhibit the discharge of the motor neurons. If this is the case, application of moist heat to the skin should also decrease the discharge of motor neurons evoked by other means than poliomyelitis infection. It was the purpose of this study to determine whether application of Kenny packs would affect the force of voluntary contractions of the muscles lying under the packs.

*Summary*

Application of Kenny foments to the flexor muscles of the forearm reduces the force of voluntary contraction by about 10 per cent. When the packs are applied to most of the body surface, the reduction is not significantly greater. These effects are probably the result not of an increase in deep muscle temperature but rather of reflex effects of the sensory impulses aroused in the skin or subcutaneous tissues by the moist heat.

## The Kenny Concepts and Treatment of Infantile Paralysis

A. Bruce Gill, M.D., Philadelphia, Pennsylvania. In THE JOURNAL OF BONE AND JOINT SURGERY, 26:1:98, January 1944.

The Kenny concepts and methods of treatment of infantile paralysis are described as "world famous." They have been widely publicized in newspapers, magazines and journals, and over the radio. The influence of this publicity upon the public has been so great that the parents of children who have been afflicted with infantile paralysis are beginning to demand that their children be treated by the Kenny method. In other words, the layman is telling the physician how he should treat a specific disease with its complications.

This dangerous publicity has not waited for a scientific or experimental examination of the claims and the merits of this method; it has not waited for a free and frank discussion by the medical profession; it has not waited even for sufficient clinical observations throughout the country to test the end results obtained by this method, which has been proclaimed as "unique," "original," "revolutionary," and "fundamentally different from that hitherto prevailing." To be guided by publicity and methods of propaganda which outrun scientific research, clinical observations, and rational analysis and discussion is dangerous for physicians and for the public. Unless all the claims made for it are eventually substantiated, unless it proves to be a cure for infantile paralysis and its complications, or, at least, a very definite and apparent improvement upon the so-called "orthodox" methods, the public will have some justification for believing that it has been deluded, and physicians who have been swept away from their positions of scientific observation and rational criticism will have reason to feel some inward embarrassment and humiliation.

The essential features of her treatment are stated to be the absence of immobilization and splinting, the meticulous use of hot packs, and a new system of muscle reeducation. Since she does employ a method of immobilization which is the equivalent of splinting, since heat, both moist and dry, has been advocated and used heretofore, and since her principles and methods of muscle reeducation are practically identical with those which have long been known and taught as standard and "orthodox" (these statements will be proved later), there is scant basic for the use of the emphatic adjectives mentioned above.

Miss Kenny's claim that "orthodoxy" has failed to recognize the physical findings in this disease will be shown to be false. There is no evidence to show that the virus of this disease affects muscles and peripheral nerves. Muscle spasm is a reflex condition, and is due primarily to the lesions in the central nervous system. Paralysis, whether complete or incomplete, whether permanent or temporary, is due to damage to the neurons. When the Kenny concept arrays itself against the vast accumulation of scientific evidence as to the nature of infantile paralysis it cannot but go down in defeat. This is not to be construed to mean that our scientific knowledge of this disease is complete and that we do not welcome and search for additions to it, but new contributions must be made on a proved scientific basis.

Recently, Sabin combined the older knowledge of the pathology and pathogenesis with new discoveries made since 1929. During and since 1929, satisfactory evidence has been adduced that the primary attack in the nervous system is on susceptible neurons, and the inflammatory reaction is the result rather than the cause of the neuronal damage. In the spinal cord, the lesions are more severe and extensive in the anterior horns, but the posterior horns are not altogether spared, and the dorsal-root ganglia almost invariably show destruction of varying numbers of sensory neurons. The motor cortex of the brain may be affected with some regularity. Of particular importance to a proper reinvestigation of the pathological physiology of the disturbance of muscle function in poliomyelitis are the lesions almost regularly present in the vestibular nuclei of the medulla, the roof nuclei and vermis of the cerebellum, and the motor cortex. It may be worth considering that, as regards certain muscle groups, the upper motor neurons concerned in initiating voluntary movement may be significantly and predominantly affected. There is no evidence of any pathological change in the muscles or peripheral nerve during the acute stage of the disease, and any change appearing later is of the type that follows destruction of the motor neurons. The absence of virus from the superior cervical sympathetic ganglia and from the coeliac plexus indicates that these structures do not serve as pathways of the virus from the alimentary canal to the central nervous system. The irreversible complete destruction of the neuron, and the partial reversible damage to the neuron (in the cases of abortive and transient paralyses) are the pathological unit of poliomyelitis.

This knowledge of the pathological changes in the central nervous system, and an understanding of the symptoms and physical findings which must inevitably accompany them, constitute the orthodox conception of infantile paralysis.

That there is muscle spasm during the acute stage of infantile paralysis has long been recognized. It is interesting to note that Wickman recognized the extensive involvement of the central nervous system by this disease, and called attention to the spasm that may be a predominant symptom when the cerebral neurons are involved. The spasm of the posterior muscles of the neck has long been observed as a preparalytic symptom.

Rest is the most important principle of treatment during the stage of acute inflammation. The value of rest in the presence of inflammation was emphatically taught by John Hilton eighty years ago, and has been an accepted principle of medical practice ever since. The central nervous system can be put at rest physiologically rather than anatomically by preventing or diminishing the function of the sensory and the motor apparatus.

When activity of the motor cells is diminished, they are placed at rest.

It can be stated positively that rest allays irritation and likewise spasm, insofar as spasm is dependent upon peripheral irritation. A proper splinting is the most effective means of putting the parts at rest. The Kenny method of immobilization is less effective and it does not completely fulfill its announced purposes.

While moist heat is preferable to radiant heat in some conditions, it does not appear reasonable that hot packs work a miracle in the treatment of acute poliomyelitis when immersion in warm water or the use of radiant heat completely fails. That heat applied in any form or by any method to the trunk and the extremities can affect the action of the virus of poliomyelitis upon the central nervous system is not credible in the light of our present knowledge of this disease. The Kenny concept of the value of hot packs is dependent upon the false assumption that there is present an inflammation in the muscles themselves. If this premise were correct, there might be more validity to her conclusion.

The use of heat during the convalescent stage of infantile paralysis has long been advised and employed. "If a partly paralyzed limb is heated it is capable of performing better muscular function than before, because muscles work better at a higher temperature. . . . (It) adds to the effectiveness of massage. . . . Heat may be applied as radiant heat or non-radiant heat. Hot water is not desirable as a form of heat, as it makes the skin tender and cannot be borne at so high a temperature as can dry heat" (Jones and Lovett, pp. 453, 454). Exercises in warm water to remove the resistance of gravity and make it possible for feeble muscles to move the limb have been extensively used. The Kenny hot packs, presumably, have an effect similar to the application of heat by other methods. It is inconceivable that one method should secure muscle curative effects while the other fails dismally.

It is evident, therefore, that the Kenny methods of treatment are very similar to the orthodox methods, and in many particulars identical with them in spite of the different terminology employed by Miss Kenny. The statement that the two methods have nothing in common displays an ignorance of the orthodox methods. The one distinctive feature of the Kenny method of treating infantile paralysis is the use of the hot pack to relieve spasm.

Lovett stated, "we should bear in mind that practically all patients improve after the acute attack is ended, that about 25 per cent, recover spontaneously . . . and that no one can foretell in a given case how rapid or how slow the improvement will be. Under these circumstances loose generalizations as to any form of treatment are likely to be misleading, and only those based on a very extensive clinical experience are likely to be of value." Furthermore, the differences in the effects of the disease in different individuals, in different communities, and in different epidemics make an accurate analysis of end-result studies exceedingly difficult or even impossible.

The propaganda for the Kenny concepts and methods of treatment has been harmful in that it has sought to cast discredit upon scientific medicine and the medical profession, in that it holds out false hopes to the victims of infantile paralysis and their families, and in that the method of treatment is expensive and is consuming of time and labor. The money could be better spent in increasing our scientific knowledge of this disease. The labor and the time could be better employed in the physical rehabilitation and in the education and the occupational training of the crippled.

### Common Foot Disorders: Rehabilitation with Physiologic Exercises

Emil D. W. Hauser, M.D., Chicago. In ARCHIVES OF PHYSICAL THERAPY, 25:2:95, February 1944.

Common foot disorders, and there are many of these, present a very practical problem. Aching, weak, sore feet are a frequent cause of absenteeism in industry as well as a definite problem to the Army and Navy.

The cause of most common foot disorders is a functional decompensation or an imbalance between the work required of the foot and the capacity of the foot to do the work. This imbalance may be due either to an increase in load or to a decrease in strength. An example of increase in load is carrying a burden, such as a full pack and a gun. The most common factor is prolonged standing on hard surfaces, necessary in many war industries. Decrease in strength is caused by overuse, particularly in unaccustomed work, which the men in the armed forces and men and women in war work encounter. Interference with normal use, such as the wearing of stiff-shanked shoes or shoes with high, narrow heels, is also a causative factor.

To correct these common disorders of the foot it is important not only to reestablish the normal relationship of the bones to each other but to relieve the functional decompensation and prevent its recurrence.

Cognizance must also be taken of the etiologic factors. Reduction of weight, periodic resting and general hygienic measures must be prescribed. It may be necessary for the patient to discontinue or change his occupation temporarily to obtain adequate rest. The rest periods are controlled, and the functional exercises are graded to the individual needs. When sufficient strength is gained to permit the industrial worker or soldier to do his routine work without strain, he is returned to it. The physical capacity is increased so that it can meet the functional demands of industrial occupation or military life, first, by reestablishing the normal statics; second, by periodic rest and, third, by physiological exercise. Physiological exercise is stressed, since it assures continued compensation once it is established.

### Tenosynovitis: An Industrial Disability

Jewett V. Reed, M.D., and Allan K. Harcourt, M.D., on staffs of the Methodist, St. Vincent's and Indianapolis City Hospitals, Indianapolis, Indiana. In THE AMERICAN JOURNAL OF SURGERY, 57:3:394, December 1943.

With the speeding up of production in most types of work, it is obvious that it is the duty of the industrial surgeon to do everything possible to reduce disability in injured workmen. In order to test the efficiency of some of our methods of treatment, we are analyzing various groups of cases in order to determine whether or not our methods can be improved.

The treatment of acute tenosynovitis has been to put the part to rest by means of a plaster splint. This is removed about every second day in order to give the part gentle passive motion to prevent stiffness, and also for the application of a diathermy treatment. After the acute symptoms have subsided, the patient is allowed to use the part for very slight movements only. When all pain has subsided the patient is allowed to resume his work gradually. Permitting patients to return to work too soon has been the cause of recurrence in several cases. When a clicking or snapping is noted, exploration is performed as soon as possible. When a distinct nodule is found, it is excised and the sheath repaired. When there is a fusiform swelling of the tendon with a constriction of the sheath, the latter should be "windowed" to allow free motion of its contained enlarged tendon.

### Observations on the Function of the Shoulder Joint

Verne T. Inman, M.D., Ph. D., J. B. Dec. M. Saunders, F.R.C.S., and LeRoy C. Abbott, M.D., F.A.C.S., San Francisco, California. From the Divisions of Orthopedic Surgery and Anatomy, University of California Medical School, San Francisco. In THE JOURNAL OF BONE AND JOINT SURGERY, 26:1:30, January 1944.

The manifest complexity of the mechanism of the shoulder joint is evident to anyone who has watched the progression of what Codman has so aptly described as "Scapulo-humeral rhythm." This rhythm is participated in by the whole complex of joints constituting the shoulder girdle. Therefore, the term shoulder joint is somewhat misleading, unless we clearly bear in mind that this expression includes no less than four different joints: the sternoclavicular, the acromioclavicular, the scapulothoracic, and the glenohumeral; and that motion at the shoulder is the sum of movement contributed by synchronous participation of all these joint units. In the development of rational procedures for the correction and reconstruction of disabilities affecting the shoulder mechanism, it is necessary to break down this complex into its various components in order that we may uncover some of the fundamental principles underlying their action.

*Summary and Conclusion*

The electric approach to an understanding of the functional mechanism of the shoulder enables us to lay down, with considerable certainty, fundamental principles which are of supreme significance to the surgeon in planning reconstructive procedures for both postpoliomyelitic paralysis and other disorders affecting this region. The evidence obtained from comparative anatomical trends in the relative size of the musculature, the elaboration of the bony parts, the theoretical force requirements, and the basic behavior at the muscles in the living, as revealed by myographic analysis, is consistent, and points in the same general direction.

The studies of joint motion prove conclusively that complete elevation of the arm, in either the coronal or frontal plane, is dependent on free motion in all the joints of the shoulder complex. The old teaching, still commonly accepted, that abduction to the right angle takes place entirely at the glenohumeral joint, and that, therefore, full elevation is completed by motion of the scapula on the chest wall, is incorrect. On the contrary, it should be stressed that motion occurs in all the joints of the region simultaneously, each contributing its share to the completion of the movement. The maintenance of the rhythm of smooth and coordinated motion requires intact joints and the preservation of power in the muscles that move them.

It is helpful in diagnosis to recognize that disturbance of rhythm or actual loss of motion in any one phase of motion may indicate that this disturbance is due to loss of function at the joint or joints which contribute the major share of movement during that phase. Furthermore, ankylosis of any one of the joints associated in the complex will cause a permanent loss in degree of movement in direct proportion to the amount of movement contributed by that joint. In fusion of the acromioclavicular joint, as practiced by some surgeons for its dislocation, a permanent loss of abduction in greater or less degree in the terminal phases of this movement, should be anticipated. Restriction at the sternoclavicular joint will not only limit abduction, but will greatly diminish its power. When the surgeon performs an arthrodesis of the glenohumeral joint, he should be aware that the maximum range is but 60 degrees of actual motion. Evidence, that awaits further experimental confirmation, suggests that this range might be increased by resection of the outer end of the clavicle with preservation of the coracoclavicular ligaments.

The myographic studies of the basic activity in the living clearly reveal the nature of the pattern of muscular activity. There is, for example, no such thing as a prime mover, as ordinarily understood. There are only patterns of action. This conception extends and amplifies the axiom laid down by Beevor when he said with regard to the brain that it knows nothing of the action of the individual muscles, but only of movement. We can, then, see a central pattern of motion carired to the periphery. Furthermore, we are forced to recognize that the principles as adumbrated by MacKenzie are entirely incorrect. MacKenzie contends that an individual muscle has but one function. Sampling of various portions of an individual muscle shows that they can act independently, but synchronously in association with the total pattern of a specific movement. This great principle is absolutely fundamental for establishing rational procedures of muscle reeducation. These patterns of muscular activity cannot be reduplicated by voluntary contraction of the muscle alone. They can only be brought into play by carrying out the precise motion itself, which probably brings into play proprioceptive mechanisms. It is our opinion that here lies the rational explanation for the empirical methods employed in the Kenny treatment of poliomyelitis. Motion, and motion alone, is the only known stimulus able to engender, in phase and degree, the muscle activity requisite for the establishment of the pattern as a whole.

### The Treatment of Infantile Paralysis

J. Albert Key, M.D., St. Louis. In THE JOURNAL OF THE MISSOURI STATE MEDICAL ASSOCIATION, 41:4:73, April 1944.

It is convenient to discuss the treatment of infantile paralysis under four headings which correspond to the four recognized stages of the disease. These are (1) the acute stage, (2) the stage of tenderness and contracture, (3) the convalescent stage, and (4) the chronic stage.

Muscle training preferably is carried out by a skilled physical therapist but the mother or a nurse can be taught to carry out the prescribed treatment for a given patient in a fairly satisfactory manner. The involved muscles first are warmed by radiant heat, then massaged gently and the patient is instructed to carry out movements which will exercise the desired muscles. Depending upon the power present in the muscles, the movements are carried out with assistance, with gravity eliminated, against gravity or against resistance. Care is taken to avoid mass movements and muscle substitution and fatigue of the weak muscles. Muscles which may have become shortened by contracture are stretched as the paralyzed muscles are exercised.

At intervals of a month or longer muscle examinations and the ability to function and relative power of the paralyzed muscles are determined and recorded. Comparison of the results of these examinations enables the physician to determine the effect of treatment. When the power of a given muscle approaches normal, treatment of this muscle is discontinued. During this period the patient is up and may resume his normal activities unless he is handicapped too severely by the paralysis. Care is taken to avoid fatigue and stretching of the paralyzed muscles and, if necessary, braces are used to protect the paralyzed muscles and to enable the patient to use his paralyzed limbs more effectively.

Investigation of the Kenny treatment leads me to conclude that Miss Kenny's three new cardinal symptoms are not new but are merely new names for symptoms

which have been recognized and treated by the medical profession for many years. Muscle spasm is what is termed early contracture; mental alienation appears to include temporary and partial paralysis, and incoordination includes the mass movements and trick movements.

The spasm subsides with the pain and tenderness when the limbs are immobilized in properly fitting casts or splints and the mental alienation and incoordination are treated by physical therapists by muscle training.

The Kenny method treats the spasm by hot fomentations which are applied continuously for twelve hours a day and are renewed at intervals of from fifteen minutes to two hours, the frequency varying with the severity of the symptoms. The hot fomentations are continued until the spasm disappears. Mental alienation and incoordination are treated by muscle reeducation, which includes both active and passive movements of the limbs. The treatment is begun as soon as possible after the diagnosis is made.

I do not approve of the Kenny treatment for a good many reasons. The more important of these are as follows:

1. The application of continuous hot fomentations and the attempts to start muscle reeducation during the febrile stage are believed to be harmful in that they needlessly disturb a sick patient who needs rest and quiet and this disturbance may lower his resistance and lead to extension of the paralysis.

2. The Kenny method precludes the use of a respirator which may save lives.

3. The pain, tenderness and contracture (spasm) are relieved more quickly and more effectively by proper immobilization than by hot fomentations.

4. Deformities are prevented more easily and more effectively by proper immobilization than by the hot packs and the constant attention of a Kenny technician.

5. The Kenny method of instituting active muscle exercise during the stage of tenderness and contracture tends to prolong this stage.

6. The Kenny method does not protect the paralyzed muscles from stretching.

7. Patients with paralysis are maintained flat in bed in the normal standing position for many months and such patients are much more completely immobilized than they would be if treated by orthodox methods. I have seen such patients with marked contractures (spasm) of the thigh and leg muscles and rigidity of the back after from six to eight months of continuous Kenny treatment and could see no evidence that the treatment had had any beneficial effect on the paralysis.

8. I believe that the orthodox method of muscle training is simpler and more effective than the Kenny method of muscle reeducation.

9. Under the Kenny method muscle examinations are forbidden and no detailed record is kept of the original condition and progress of the patient.

10. The Kenny method forbids the use of splints which may protect paralyzed muscles, prevent deformities and increase the usefulness of paralyzed limbs.

11. The Kenny method has nothing to offer for the late effects of the disease, many of which are alleviated by orthodox surgical procedures.

12. The Kenny method is expensive in equipment, materials and manpower and will upset the entire routine of a hospital in which it is used on any considerable number of patients.

13. The Kenny method is a rigid regime which demands the services of a relatively large number of especially trained technicians for a given number of patients. Consequently, it is not suitable for use in an epidemic of any magnitude. The orthodox method is elastic and has weathered many epidemics.

14. I object to the Kenny propaganda which has misrepresented grossly the orthodox methods and results to the public.

15. Orthodox treatment of poliomyelitis is based upon known pathologic lesions which have been demonstrated repeatedly. The Kenny concept of the disease is based upon the belief that there is a condition in the muscles (apparently an acute inflammation and resultant spasm which demands treatment. No primary pathological lesions have been discovered in the muscles of patients or experimental animals ill with poliomyelitis.

16. From what has been said it is obvious that I consider the Kenny treatment of poliomyelitis a luxury treatment which, like some other luxuries, may actually do the patient more harm than good. Since there is no evidence that it lessens either the extent or the duration of the paralysis, I believe that physicians in Missouri should continue to use the less expensive orthodox treatment which in three recent epidemics has been shown to result in the recovery of about 80 per cent of the patients. When and if it can be shown that any procedure employed in the Kenny method produces results which are better than those obtained by orthodox methods, then that procedure should be added to medical armamentarium.

### Analysis of Neuromuscular Disorders in Poliomyelitis

Joseph Moldaver, M.D., New York, N. Y. From the Department of Neurology, Columbia University, College of Physicians and Surgeons, and the Neurological Institute of New York. In THE JOURNAL OF BONE AND JOINT SURGERY, 26:1:114, January 1944.

The chief disorders resulting from infantile paralysis have been considered in this paper. The principal and most crippling symptoms are muscle paralysis and paresis. This is the result of lesions of the anterior-horn cells. In the affected muscles, neuromuscular degeneration can be accurately determined by chronaxia. The degree and the extent of the injury are evaluated by this test; this aids in the diagnosis and the prognosis. Inflammation of the sensory protoneurons is not necessarily found at exactly the same level as the injuries to the anterior-horn cells. Therefore, pain and tenderness of muscles are found in nonparalyzed as well as in affected muscles. Pain might be explained as a referred pain which is usually increased by the stretching of the muscles.

The Kenny concept is fundamentally different. Three cardinal symptoms are described,—muscle "spasm," "mental alienation," and "incoordination." To test this concept, a series of investigations have been carried out, since obviously a clear understanding of the symptoms is of great importance for the diagnosis, the prognosis, and the treatment of any disease. The various parts of the concept have been considered.

1. "Spasm" is not "the most damaging symptom of the disease;" it is a complex and ill-defined phenomenon, under which several different conditions are included. "Spasm" does not lead to neuromuscular degeneration.

2. In paralytic and paretic muscles called "alienated," our observations showed that there was always some degree of neuromuscular degeneration. Among these muscles, some were partially denervated; these have a good chance to recover.

3. There is no clinical evidence of "incoordination" in the ordinary sense. The patient attempts voluntarily or involuntarily to use a stronger muscle for a weak or paralyzed one. This abnormal use of an extremity is substitution and not "incoordination."

### Wartime Physical Reconstruction

Frank H. Krusen, M.D., Section on Physical Medicine, Mayo Clinic, Rochester, Minn. In THE MILITARY SURGEON, 94:3:147, March 1944.

In connection with the present war the world is facing the greatest problem in rehabilitation ever known. This problem is pressing at this very moment and will increase in importance and extent from month to month until long after the close of the war. It is essential that adequate personnel and adequate facilities to cope with the problem of physical reconstruction be provided.

The extent to which physical agents are employed in reconstruction work is not always understood by the medical profession at large. It has been found that in ordinary civilian practice from 5 to 10 per cent of all patients require some form of physical treatment. In one large clinic last year, 9.5 per cent of all patients were referred to the section on physical medicine for some form of physical therapy. In wartime the percentage of patients who require physical reconstruction is much greater. In several of the army hospitals the percentage of patients referred for physical therapy varies between 20 and 30. The disabling conditions found in war casualties often require some form of physical treatment. The traumatic lesions amenable to physical treatment most often encountered in military medicine can be divided roughly into two large groups; (1) trauma of bones and joints, including fractures, dislocations, stiff joints, bone grafts and traumatic arthritis and (2) trauma of soft tissues, including scars (especially after amputations), contusions and lacerations of muscles and tendons, postural strains (particularly backache and flat foot), and paralysis (especially as a result of peripheral nerve injuries). In addition to these traumatic conditions, a large number of medical and neuropsychiatric disabilities will require some form of physical or occupational therapy. Arthritis and fibrositis which are frequently encountered in military practice often can be benefited by the employment of physical therapy in conjunction with other methods of treatment. Perhaps 25 per cent of the patients disabled by the war present some type of neuropsychiatric disturbance which can be benefited greatly by the judicious employment of physical and occupational therapy. Therefore, it behooves physicians in this country to make special plans in wartime to train enough physicians and technical aides in physical reconstruction and to provide an ample amount of equipment and space for reconstruction work.

### The Mechanism of Muscle Spasm in Poliomyelitis

Herman Kabat, M.D., Ph.D., and Miland E. Knapp, M.D., Minneapolis, Minn. In THE JOURNAL OF PEDIATRICS, 24:2:136, February 1944.

One of the fundamental innovations of the Kenny concept of poliomyelitis is the emphasis placed upon "muscle spasm." This is a condition characterized by shortening of the skeletal muscles which appears in the acute stage of the disease and may persist for months or years. It may be identified in the early stages by characteristic deformities, by prominence of tendons, by flatness and narrowing of muscle bellies, by increase or decrease in the number and depth of skin folds or creases, by limitation of range of passive joint motion, and by other evidences of muscle shortening. The muscles in spasm are painful to stretch or pressure and may often be weak or even completely paralyzed. Spasm may be the direct cause of loss of function in opposing muscles because of the mechanical interference with motion produced by the shortened painful muscle. Relief of this condition may lead to increased active as well as passive motion and increased power in apparently paralyzed muscles by removal of this mechanical obstruction. Failure to relieve "spasm" by energetic and persistent therapy may result in permanent deformity as well as dysfunction of antagonistic and synergistic muscles.

*Summary*

1. Muscle spasm in poliomyelitis is of two types:
   A. Hypertonus
   B. Hyperirritable stretch reflex

2. The clinical characteristics of muscle spasm are described.

3. Muscle spasm is relaxed temporarily by spinal anesthesia or block of the myoneural junction in acute and subacute poliomyelitis. Intravenous pentothal decreases muscle spasm moderately in some patients and is ineffective in other patients.

Muscle spasm in poliomyelitis has a neurogenic mechanism and is apparently the result of an increased discharge of nerve impulses through the motor neurons.

4. Evidence is presented to support the theory that the pathologic basis of muscle spasm in poliomyelitis is a lesion of internuncial neurons in the gray matter of the spinal cord. The muscle spasm is produced as a result of release of proprioceptive reflexes from inhibition.

A. Muscle spasm has been produced in the experimental animal by temporary arrest of circulation in the spinal cord. Correlated with this muscle spasm, the spinal cord showed a lesion localized to the internuncial neurons, while the anterior horn cells appeared normal.

B. In sixty-eight cases of poliomyelitis, review of the spinal cord pathology revealed an internuncial lesion in almost every patient. Twenty-six patients showed an internuncial lesion with relatively normal anterior horn cells.

C. Measurements of chronaxie of muscles in fourteen patients with poliomyelitis who exhibited marked muscle spasm demonstrated that there is no correlation of muscle spasm with anterior horn cell damage. Many muscles in spasm showed a normal chronaxie while other muscles in spasm showed more or less marked increases in chronaxie. These results suggest that anterior horn cell destruction is not the basis of muscle spasm in poliomyelitis.

D. Prostigmine, acting on the spinal cord to inhibit proprioceptive reflexes, relaxes muscle spasm and may be of therapeutic value in poliomyelitis.

### Principles of Treatment in Peripheral Nerve Injuries

Major Max T. Schnitker, Medical Corps, Army of the United States, Bushnell General Hospital, Brigham City, Utah. In NORTHWEST MEDICINE, 43:1:9, January 1944.

One of the common injuries seen in war casualties is that of bullet and shrapnel wounds of peripheral nerves. A large number of peripheral nerve injuries were seen and many different types of repair were carried out in the last war, but no standard test of recovery of function was applied and few of the cases were followed for a sufficiently long period to allow definite conclusions to be made. By a "sufficiently long period" I mean at least three to five years after the repair of the injured nerve, with a careful analysis of the electrical activity and muscle group function on a standard basis so that results can be compared. We hope that when this war is over, our organization will have been so planned that such a careful study can be completed. Such a program has just been put into effect.

The aims of physical therapy are to improve the circulation to the involved parts by massage and galvanic exercise; to diminish muscle wasting and fibrosis by

massage; and to maintain mobility of joints by passive and active exercises. The problem of the type and amount of electrical stimulation to be used to enhance nerve regeneration after repair is still much in debate. Suffice it to say, the general opinion now held is that there is a definite beneficial effect on the nutrition of the limb and on its readiness to become useful, once the voluntary power has returned. From the psychological point of view its value is profound, since the time required for such specialized tissue as nerve to heal requires the greatest patience on the part of both physician and patient.

*Summary and Conclusions*

War carries with it many problems of treatment of peripheral nerve injuries. They are being brought toward a successful solution both by scientific experimental investigation and practical clinical application. Histologic studies show that it is the progressive fibrosis at the myoneural junction and in the muscle that prevents full return of function after an otherwise successful nerve suture. This necessitates early nerve suture before fibrosis becomes extensive.

Early nerve repair in an infected wound is now being accomplished with the aid of the sulfonamides and penicillin, both locally and systemically.

So-called "bridging operations" are being discarded in preference for end-to-end anastomosis, the gap in the nerve being overcome by delayed nerve stretching, transplanting through a shorter course or even shortening the extremity by removal of a segment of bone.

Nerve suture is now being done with very fine silk, tantalum wire, or nerve "glue" (plasma or acacia) in place of catgut which is being discarded because of its greater tissue reaction and scar formation. Tantalum foil is commonly employed to wrap around the nerve that has to be replaced into a scar tissue bed.

As the nerve regenerates, it has been found that the average rate of regeneration is about 2 to 3 mm. a day rather than 1 mm., as stated in the older textbooks.

The principles of physical therapy, namely, relaxing the paralyzed part and keeping the involved portion of the extremity in optimum position and the uninvolved portion in free motion to facilitate rapid return of function, are again emphasized.

## Recent Experimental Studies on the Effects of Immobilization of Denervated Muscles

Ora Leonard Huddleston, M.D., Denver, Colorado. In SOUTHERN MEDICAL JOURNAL, 37:2:77, February 1944.

Lower motor neuron paralysis occurs in a number of conditions such as neuritis, peripheral nerve injuries, anterior poliomyelitis, neuronitis and other lesions of the central nervous system involving the anterior horn cells. Most authorities have accepted the principle of immobilization of paralyzed muscles in the position of optimal relaxation as the treatment of choice in order to establish the earliest recovery of motor function. Appropriate measures are usually employed to prevent undue stretching or overactivity of the damaged muscle. Robert says:

"It has been well known to surgeons that so long as a paralyzed muscle is stretched it will never recover. Neurologists and surgeons alike have drawn attention to the importance of keeping a paralyzed muscle in a relaxed position."

*Conclusions*

(1) Lack of immobilization of the denervated muscles did not interfere with regeneration of the motor nerve supply.

(2) Regeneration of the motor nerve supply was found to be more complete in the animals in which no immobilization was applied following denervation than in those in which the denervated muscles were immobilized.

(3) All the qualitative and quantitative data obtained from muscle weights, tension myograms and electrical tests showed that immobilization in some way interfered with the reinnervation of denervated muscles.

(4) Immobilization of muscles in the position of maximal muscle length showed less functional recovery (greater per cent weight loss, muscle power and higher thresholds for electrical stimulation) than those immobilized in minimal length. From these findings it may be concluded that fixation of muscles in a position of elongation of the muscle fibers was more detrimental to the recovery of the motor function following paralysis than when immobilized in the position of minimal muscle length.

## Section of Orthopedics: Discussion on Painful Feet

President—B. H. Burns, F.R.C.S. In PROCEEDINGS OF THE ROYAL SOCIETY OF MEDICINE, 36:2:57, December 1943.

Mr. C. Lambrinudi: The foot problem in the Army is a fairly formidable one. In my experience alone, working at several clinics, I find that a third of the cases sent up by the regimental officers for an expert orthopedic opinion are foot cases.

Most orthopedic surgeons in charge of busy clinics, if asked before the War who suffered most from foot trouble, men or women, would unhesitatingly have answered—women, in at least a proportion of 5 to 1. Because so many of us had become accustomed to associate foot pains and deformities with women, the erroneous conclusion was drawn that they were due to some female peculiarity or to their particular form of footwear. But experience of war has shown that foot troubles are as common in men, under stress, as in women. This was not realized in peace-time because men did not then use their feet to the same extent, or under the same trying conditions. A man was better able to select his occupation according to his capacity. He could rest at weekends, and, on the whole, did not go to a physician unless his disability interfered with his wage-earning capacity. But a woman was constantly on her feet tending her home and children; she did not rest at weekends, and she was periodically subjected to the stresses of pregnancy. Moreover, women were employed in larger numbers in such trying occupations as shop assistants and waitresses, and because of restricted choice they were obliged to wear shoes unsuitable for overworked feet.

It is evident that the foot problem on the whole is muscular fatigue, leading to ligamentous strain, and footwear only came into the picture in so far as it was an extra stress.

*Summary and Conclusion*

(1) More than half of the total of Service out-patient attendances at an E.M.S. Hospital are for disabilities of the foot.

(2) 57 per cent of painful feet are associated with deformity of the anterior or longitudinal arches or with callosities.

(3) The majority have suffered minor foot disability prior to Army life.

(4) Long hours of marching or arduous training, rather than drill, or trades, is the precipitating cause of foot breakdown.

(5) Remedial treatment has, in our hands, been largely disappointing. This is, in part, due to lack of the incentive to get better; in part to the advanced type of case which is admitted to hospitals.

(6) Operative treatment is seldom indicated in the treatment of the Service foot—hammer toes, occasional tenotomies and removal of exostoses, being the only operations performed. In civilians, better results always can be obtained.

### The Pathology of Arthritis

Samuel A. Goldberg, from the Pathological Laboratory, Presbyterian Hospital, Newark, N. J. In AMERICAN JOURNAL OF CLINICAL PATHOLOGY, 14:1:22, January 1944.

The study of the pathology of arthritis dates back to antiquity. The evolution of the theories of the changes that take place in the affected joints parallels the trends of thought regarding the disease processes in general. Our modern knowledge of the pathology of arthritis was accelerated by the monumental work of Nicholls and Richardson. They concluded that deforming arthritis may be divided into two groups, namely, the proliferative and the degenerative.

*Summary*

1. Very early changes of rheumatoid and degenerative arthritis were described. They are probably two distinct disease entities, etiologically and morphologically.

2. Rheumatoid arthritis may show evidence of activity for a long time, particularly where ankylosis does not occur.

3. Some of the changes described as being present in degenerative arthritis such as synovial villi, subchondral cysts, and islands of cartilage, possibly represent an inactive phase of rheumatoid arthritis.

4. The earliest changes in the articular cartilage appears to be altered pH to the alkaline side as evidenced by a change in the staining reaction.

### March Foot (March Fracture): Its Early Diagnosis and Treatment.

In THE ARMY MEDICAL BULLETIN, 68:134, July 1943.

The subject of march fractures has been recently brought to the fore because of the rigorous training a soldier must undergo in preparation for modern warfare. Briethaupt, a Prussian, first wrote of this condition in 1855, followed by several late articles by men in this country, France, and England. Analyzing a large number of so-called march fractures found in our clinic, we feel that the term march foot more nearly describes the condition and that the fracture is only a part of the syndrome. The sequence of occurrence and the three types of lesions and their description, leading us to this conclusion, will be described.

1. The four important points for early diagnosis of march foot are described: Typical history, dorsal swelling and possible ecchymosis, palpable mass or callus, point tenderness at fracture or callus site.

2. X-rays may or may not show fracture or callus early.

3. March foot is classified into three distinct categories.

4. With symptoms as outlined in 1, treatment is started immediately and continued until pain has disappeared.

5. An ambulatory-type of strapping is presented. Certain severe fractures are hospitalized and treated by strapping or cast.

6. Convalescence requires three to six weeks. Definitely shortened by strapping and semi-ambulatory method.

7. All cases return to duty.

8. "March foot" is perhaps a better term for this syndrome.

9. An analysis of 100 patients is presented.

The podiatrists, Cpl. J. J. Rudnick and Cpl. John W. Westlake, have played an important part in the care of these patients. These men, of special training, though little recognized, do a very valuable work, especially in basic training centers where foot care is so important. Being trained to care for the various ailments of the feet, measuring and fitting arch supports, and strapping, these men have proved to be of inestimable value in the orthopedic clinic.

### Lesions of the Musculotendinous Cuff of the Shoulder: The Exposure and Treatment of Tears with Retraction

Harrison L. McLaughlin, M.D., New York, N. Y. From the Fracture Service of the Presbyterian Hospital in New York, and the Department of Surgery, the College of Physicians and Surgeons, Columbia University. In THE JOURNAL OF BONE AND JOINT SURGERY, 26:1:48, January 1944.

Dr. E. A. Codman repeatedly pointed out the importance of the subacromial structures in connection with the subject of "painful shoulder." He mentioned the great prevalence of this complaint, and emphasized the tremendous total of man hours lost to industry because of it. Under the stimulus of his teachings, a considerable number of these cases have been studied by the Fracture Service of the Presbyterian Hospital in NewYork.

It is now fashionable, although incorrect, to label most sore shoulders devoid of fracture as "bursitis." Seldom is it realized that the term bursitis is no more a diagnosis than headache or jaundice, and that, when present, it usually constitutes a second condition having no connection with the primary lesion other than proximity. It is the purpose of this paper to discuss the exposure and therapy for one of these primary conditions—namely, a tear of the intrinsic musculotendinous cuff with retraction.

There has been no set regimen for postoperative care. Physical therapy is useful when it is employed to help the patient progress in a program of active exercises, but is considered to do much more harm than good when the patient gets the idea that the treatments are doing something active toward his rehabilitation. Under the latter circumstance, progress is almost always in reverse. Maintenance of mobility and gradual progressive resumption of use is the essence of the after-care, but only one person, the operating surgeon, whose judgment is tempered by a knowledge of the size of the lesion, the condition of the tissues involved, and the security of the repair, is qualified to evaluate the speed and completeness with which motion and use may be allowed. Immediate gentle motion in balanced suspension is the rule until the wound is healed. The patient is then allowed out of bed and is taught a program of active, gravity-free, pendulum exercises. As soon as symptoms and strength permit, wall-crawling and gibbet types of exercises are added. All exercises should be in short periods at frequent intervals, and should be done up to but not past the point of pain or fatigue. Five-minute exercise periods every hour on the hour are considered ideal. All patients are encouraged in the immediate resumption of normal light function, but as a rule active elevation of the extremity is not allowed until some time between the third and seventh week, depending upon conditions observed at the time of operation.

### The Future of Spa Treatment

F. Clayton, M.D., F.R.C.P. Physician, Warneford and South Warwickshire. General Hospital, Leamington. In THE PRACTITIONER, 907:1:33, January 1944.

The value of physical medicine as practiced at the spas has been slowly and rather grudgingly appreciated by the medical profession of Great Britain, and favorable claims made by practitioners in this branch of medicine have often had a skeptical reception. It is right and proper that this traditionally British attitude should be sustained until convincing proof is forthcoming, but the present revival of interest both in medical and non-medical circles concerning rehabilitation with all its implications has given a great stimulus to physical de-

partments everywhere, and what was previously regarded as ancillary has now become an essential integral service in every hospital. The clinical evidence of its worth accumulated from years of empiric usage is beginning to be reinforced by research and planned experiment, thus establishing an acceptable and scientific foundation for further development. Crude biological tests are being supplemented by accurate physical measurement, and health centers and spas throughout the country will in future take their full share in helping to raise the level of the nation's health by the preventive and curative means at their disposal.

*Summary*

From these general observations it will be seen that:

(1) A distinct change of outlook is overtaking the spas of Britain. Here plans are afoot for the maintenance and improvement of the nation's health.

(2) There will still remain as visitors to the spas those for whom palliative and retardatory treatment is alone applicable.

(3) Attention to early signs and symptoms will stem the flood of those misfortunes which now ravage the country, and are considered chronic or incurable.

(4) Rest at home, or in hospital, where etiological factors can be investigated, will be enjoined as a first step to treatment.

(5) Spas, with their natural advantages and the experience gained therein, should be able by enthusiasm and enterprise to render useful service as rehabilitation and health centers.

(6) Two plans, drawn for me by F. B. Charles, are intended to indicate graphically the chief essentials of a modern spa.

## Ice As a Local Anesthetic

Halley H. Friederwitzer, Bronx, N. Y. In MEDICAL RECORD, 157:1:43, January 1944.

There are times when simple things are prone to be disregarded when searching for more complicated formulas or structures. In the endeavor to relieve human beings of their pains, anesthetics have been devised galore, but mostly for hospital use or in complicated cases. When surgical intervention is necessary on a patient who has a so-called minor condition, and this occurs at the patient's home or even at the office, I have found simple ice to be an excellent anesthetic. There are no contraindications to ice as an anesthetic.

First, I should like to explain the physiological mode of action of ice as an anesthetic and its concomitant problems. Whether or not the area is infected, ice is an indicated anesthetic that does not tend to spread infection. Its first action of cold causes an ischemia of the area involved. This immediately prevents a spread of the infection, as well as causing a freezing and thereby an anesthesia of the nerve endings, whose sensitive points are generally very near the external layers of the epidermis. The localized area becomes somewhat coagulated and lumpy and is now ready for surgery, which lasts up to fifteen to twenty minutes, depending, naturally, upon the amount of time the ice has been in contact with the area involved.

For home use, or emergencies, or when the area is badly infected and an injection of novocaine is unwise, or where ethyl chloride causes too much pain because of its burning sensations, ice is the method of choice for anesthesia.

I have found ice to be useful in the following types of cases:

1. Infected toenails: Keep ice in sterile gauze to a previously sterilized skin for twenty minutes.

2. Carbuncle or boil: Ice works best in these cases; keep ice on area for twenty minutes.

3. Paronychia: Keep ice on for ten minutes.

4. Dislocations of wrists, fingers, and elbows: Keep ice on area with a little pressure, for twenty to thirty minutes.

5. Abscesses anywhere on or near the skin surface: Keep ice on area between fifteen and twenty minutes.

6. Skin growths (nevi and the like): Keep ice on area for ten minutes and remove growth by knife or cautery.

In conclusion, let me state that ice is a good local anesthetic in selected but abundant cases, and extremely useful in emergencies, as well as being simple. More thought on the subject will increase the uses of ice as a safe, simple and practical local anesthetic.

## Painful Feet

Capt. Robert Bingham, M.C., A.U.S. In J.A.M.A., 124:5:283, January 29, 1944.

The original and effective principle of treatment has been demonstrated by Dr. Morton to be the restoration of the weight bearing function and normal position of the first metatarsal segment of the foot. This is most simply done by placing a platform or support of the proper thickness under the sole of the foot beneath the distal head of the first metatarsal. The specific treatment compensates both for the shortness and for the relaxation of the first metatarsal segment, gives support to the medial side of the longitudinal arch and relieves the symptoms caused by excessive weight thrust on the second metatarsal and midtarsal region of the foot.

After the insoles are supplied to the patient they are checked for fitting and the proper height of the platform. Then they are worn for an hour or more daily, the time being increased until they are comfortable and the symptoms from the disorder have disappeared. The patient transfers them from one pair of shoes to another in changing footwear, never going without them again for more than a few hours.

General treatment is emphasized for the first week or so for the relief of acute symptoms and to strengthen the foot muscles whenever necessary. Exercises, contrast and whirlpool baths, and periods of rest and elevation of the feet are used. If the soldier is being treated as an outpatient, a period of seven to ten days on "light or fatigue and kitchen policy duty" often is recommended to his company commander.

Of 100 soldiers treated by this method, 76 have been able to continue full military duty, "general service," while wearing the "compensating insoles."

## Frostbite

Major Charles W. Bankert, Medical Corps, Army of the United States. In ARCHIVES OF PHYSICAL THERAPY, 25:3:149, March 1944.

As a result of my experience I have noted that hoarseness or even aphonia may develop rapidly as a result of sudden inhalation of cold air through the mouth. One must learn to breathe through the nostrils. There are persons whose feet and hands perspire readily and in whom one may find evidences of vasomotor instability or disturbance of the autonomic nervous system. These persons do not stand cold climates and cannot adapt themselves to military service in subzero temperatures, particularly if they work under great tension and are unable to relax readily. The investigations which are now being carried out will further our knowledge of the effects of cold and thereby enable us to improve preventive treatment.

### Tender Muscles in Sciatica: Electromyographic Studies

Frank A. Elliott, M.B. Cape Town, M.R.C.P., Major R.A.M.C.; Medical Specialist. In THE LANCET, 1:3:49, January 8, 1944.

The purpose of this article is to record some observations on the tender spots, sometimes described as nodules, found in the muscles of the buttock and calf in certain cases of sciatica. They commonly occur in muscles with an extensor function, are sharply localized, and, when palpated, give rise to pain which may radiate down the limb. Both the local tenderness and the sciatica itself can in some cases be abolished by injecting procaine into the tender spots, whereas the injection of a similar amount elsewhere is without effect—i.e., the action is local. It is not surprising therefore that contemporary writers have fostered the belief that these tender spots are the site of an inflammatory or rheumatic process which gives rise to referred sciatic pain, and that the successful exhibition of procaine confirms the diagnosis and by inference excludes other causes. It is not generally recognized that tender spots indistinguishable from the more benign forms of myalgia both in their clinical features and in their response to procaine may be found in the muscles supplied by an irritated nerve-root. This is most commonly met with sciatica due to prolapse of the nucleus pulposus, but also occurs in spinal tumors.

*Summary*

There is a form of myalgia, arising in muscles supplied by an irritated root, which simulates so-called fibrositis both clinically and in its response to local injections of procaine, and is responsible for a variable and sometimes considerable proportion of the patient's total discomfort. Relief from procaine does not, therefore, exclude a root lesion. Electromyographic studies show that the tender spots in muscles are as a rule the seat of a localized increase of irritability and a continuous discharge of action potentials which lasts as long as the needle remains in the muscle. On clinical grounds it is inferred that this activity is not merely the sustained response of irritable muscle to the presence of the myogram needle, but represents involuntary spasm of small groups of muscle fibers. Certain characteristics of the motor discharge appear to support this view, but further work is necessary to confirm it. The spasm is thought to be the source of pain and tenderness. Similar activity has been recorded in "fibrositis" of the shoulder girdle, and in the extensor muscles of the arm and forearm in cases of "brachial neuritis" both with and without root signs. Muscle spasm consequently is considered to play a part in what for convenience may be called the rheumatic myalgia as well as in the less common root syndromes. On theoretical grounds any source of irritation, whether in the root or not, could serve to generate reflex spasm, but in practice there appear to be additional unknown factors which determine the presence of spasm in some cases and not in others.

### Experiences with the Kenny Treatment for Acute Poliomyelitis in the Epidemic of 1942, Monmouth and Ocean Counties, New Jersey.

Nicholas S. Ransohoff, M.D., New York, N. Y. In THE JOURNAL OF BONE AND JOINT SURGERY, 26:1:102, January 1944.

What, then, can be reported as our present opinion in reference to these experiences with the Kenny method?

1. It was determined at the outset to try the Kenny method for three years; this is being done.

2. In our community, at least, due to newspaper publicity, parents have demanded the Kenny treatment, and no other.

3. The cost of Kenny treatment, thoroughly carried out, is tremendous. Unfortunately, because of clerical shortage, the hospital administration has not been able to supply accurate comparative figures. A personal estimate would be that the Kenny treatment is at least five times as expensive as the so-called orthodox treatment.

If, however, it can be proved that this method is superior, then the question of cost is not a consideration.

4. It can be asserted that no patient has suffered ill effects because of treatment by the Kenny method. For a time, before the importance of stretching tight muscles was appreciated, there was considerable concern that fixed deformities might develop. After Sister Kenny demonstrated the proper handling of this problem, there have been no further difficulties to date.

(There will probably be objections made to the term "stretching tight muscles." By this is meant the putting of parts through their complete range of motion, and attempting to simulate physiological movement.)

5. The experience gained in the epidemic of 1942 will make the treatment of patients better in subsequent years.

6. It is felt that the moving parts through complete ranges of motion has been of decided benefit from a physiological point of view. This increases circulation, movement of lymph, et cetera.

7. In a discussion of the Kenny treatment at the Hospital for Joint Diseases, the author said, "Throw away your braces, but not too far." It was interpreted as condemning the method, by those who heard this remark. It was not meant as condemnation, but was merely a statement that all patients will not make complete recoveries, and that braces will be needed.

8. Sister Kenny has made a real contribution. She herself, like all originators of a method, reports results which we have not yet been able to duplicate. She has been endowed with a great gift in the healing art. There is still a question as to whether or not she can impart this gift to her disciples. Certainly, through her, a large number of people are being trained in an excellent method of muscle reeducation. For this, if for nothing else, all who have to do with the therapy of poliomyelitis must be most grateful.

How much of the Kenny concept will remain intact is not known. Many of her ideas of kinesiology are still difficult to accept. Others are so simple and apparent that it seems incomprehensible that they were not recognized long ago.

In conclusion, therefore, the author reserves his opinion until further experience demonstrates the exact value of the Kenny method. Then only may a final report be given.

### The Use of the Convalescent Ward in the Rehabilitation and Disposition of Disabled Soldiers

Ora L. Huddleston, Major M. C. Physical Therapy Section, Fitzsimons General Hospital, Denver, Colorado. In ARCHIVES OF PHYSICAL THERAPY, 25:2:87, February 1944.

The medical and surgical care of patients in the Army is somewhat different from that in civilian practice. It is necessary for patients to be restored to complete health before they are returned to active duty. They must be physically fit and thoroughly qualified to withstand the strenuous physical exertion and hardships which soldiers are expected to withstand in rigorous combat. Many illnesses or injuries require long periods of hospitalization. In such instances it would seem desirable to provide some means of rehabilitation besides rest and diet in order to facilitate recovery. The need for an active rehabilitation program has been realized for a number of

years at Fitzsimons General Hospital, especially in the surgical service.

Although the convalescent ward program has achieved many of the aims for which it was originally designed, there is still room for improvement. The following are some suggested projects which need development in order to perfect our rehabilitation program: (1) To begin the reconditioning of the patient as soon after admission as possible. (2) To emphasize the rehabilitation of an individual as a whole rather than to limit therapy to the correction of his physical ailment. (3) To institute the early use of physical therapy and occupational therapy in the wards even before operation and to resume the ward treatments immediately after operation. (4) To provide supervised therapeutic exercises in the wards both for individual patients and for groups of patients, and see to it that the exercises are done according to schedule, a prescribed number of times per day. (5) To utilize more extensively the therapeutic aspects of occupational therapy and place less emphasis on its recreational attributes. (6) To expand active exercise therapeutics by providing a sufficient number of athletic instructors, trainers and male physical therapy aides so that the exercises can be done by groups no larger than twenty-five or thirty patients. The additional personnel should be assigned to assist the medical officer of the convalescent ward. (7) To provide additional educational lectures and demonstrations, educational moving pictures and forum or panel discussions of topics of current interest. (8) To organize and develop adequate facilities for speech therapy. (9) To train more medical officers in rehabilitation therapy so that proper guidance and supervision of present and future rehabilitation programs may be provided by members of the medical profession.

A program of this type operated by the medical department would not only provide better treatment for the soldiers but would obviate the danger that rehabilitation therapy may gravitate into the hands of untrained and unqualified nonmedical personnel. It is my feeling that this is a field in which physical therapy physicians should interest themselves and that they should support the formulation of adequate rehabilitation programs throughout the country, both during and after the war.

### A Note on Rehabilitation: Work as Therapy

Joseph Fetterman, Major, M. C., A. U. S. In THE OHIO STATE MEDICAL JOURNAL, 40:2:117, February 1944.

The number of soldiers who will have suffered disability from injury and illness is expected to be high. The concentrated fire of modern weapons produces a large number of battle wounds. In addition to war wounds there are the every day injuries from falls, collisions, traffic accidents, not to stress the effects of everyday illnesses. The damage wrought by blast and bullet and shrapnel obviously leads to scars in the injured tissues and deformities of the body. Disorders of the nervous system, as well as direct involvement of muscles and joints lead to weakness, stiffness, and paralysis.

Such disabilities involving civilian and soldier are accompanied by the additional symptoms contributed by the mental attitude. Injury brings with it fright, anxiety, and sets in motion mental attitudes some of which are unhealthy. Such mental processes may engraft an overwhelming disability upon a simple structural defect. It is not rare to see a patient who has suffered a slight fracture develop a secondary paralysis upon a hysterical basis.

We may expect war to bring an added number of disabilities among soldiers and civilians as a result of combat wounds, everyday injuries and illnesses. We should prepare to anticipate this problem with measures which will convert such patients into useful, even though handicapped individuals. (Cairns, Jefferson, Brain.)

The chief methods available have been medical and surgical. Surgery can accomplish much toward improving muscle power, removing disfiguring and stiffening scars; drugs can correct faulty physiological processes, relieve pain, reduce muscle spasticity, and calm tension; physical therapy will contribute towards muscle freedom as well as train muscle function. Psychotherapy occurring from these measures as well as given directly will do much towards the removal of emotional obstacles to recovery and may stimulate the will to get well. Thus rehabilitation is achieved by several interrelated procedures: the improvement in local function, the trained skill, general well being, and the willingness to work. But there is needed the opportunity to utilize the improved functions —an available job. A discussion of work as an aid to therapy is the purpose of this paper.

### The Degree, the Extent, and the Mechanism of Muscle Spasm in Infantile Paralysis

Harry D. Bouman, M.D., and R. Plato Schwartz, M.D., Rochester, New York. In NEW YORK STATE JOURNAL OF MEDICINE, 44:2:151, January 15, 1944.

During the past three years the medical profession has been invited to change its concepts on the mechanism and treatment of infantile paralysis. Our attention has been drawn to the treatment of muscle spasm, and those who advocate this change speak of the "ever present and damaging effect of spasm" on muscle function.

Spasticity is a general phenomenon in the early stages of infantile paralysis. It is independent of muscle weakening and appears in agonist and antagonist muscles which do not show weakening during the course of the disease.

This latter fact means that spasticity in a certain muscle is not automatically followed by weakening of its antagonist. In fact, spasticity and weakening are two separate phenomena, each dependent on disturbance of specific functions of the anterior horn cells. Recent findings in the physiology of the spinal cord have made it possible to offer a scientific explanation of the mechanism of muscle spasm in infantile paralysis.

The data obtained from the treatment of 22 infantile paralysis patients in regard to the course of improvement in muscle function and the disappearance of spasticity under treatment are now being summarized for early publication.

### Neuromuscular Electrodiagnosis

Captain Sidney Licht, Medical Corps, Army of the United States. In THE BULLETIN OF THE U. S. ARMY MEDICAL DEPARTMENT, 72:80, January 1944.

Electrodiagnosis has not received the attention its importance warrants, in this country. During peacetime the number of peripheral nerve lesions is small, and the clinician has sufficient time to evaluate damage and progress by tedious muscle function tests. The number of nerve injuries resulting from combat casualties is so great that rapid methods of diagnosis are desirable. Electrodiagnosis is rapid, exact, and independent of patient cooperation.

There are several diseases in which muscle-nerve testing is a great aid in differential diagnosis. Inasmuch as the group is heterogenous they are listed alphabetically:

Bell's palsy, hysterical paralysis, myasthenia gravis, myotonia congenita, poliomyelitis, polyneuronitis, Wilson's disease.

### Poliomyelitis: Its Present Status

N. B. Nelson, M.D., Los Angeles. In CALIFORNIA AND WESTERN MEDICINE, 60:1:21, January 1944.

Clinicians are accustomed to dealing with practical problems. They ask practical questions and expect practical answers. They have little time to consider the many vague theories of poliomyelitis, however intriguing they may be. The present discussion avoids controversial subjects as much as possible, and attempts to give practical answers to five practical questions which vitally concern clinicians.

*Conclusions*

1. Quarantine of poliomyelitis is of very little value except to prevent panic and to satisfy public demand.
2. Sanitation has had no demonstrable effect on the distribution of poliomyelitis.
3. When infection with the virus of poliomyelitis occurs, previous tonsillectomy predisposes to the bulbar form of this disease.
4. A search for muscle spasm is a definite help in the diagnosis of poliomyelitis.
5. Hot packs during the spasm stage and subsequent muscle reeducation offer the most for the acute cases. Nerve crushing offers interesting possibilities for increasing muscle strength in the old case.

### Physiologic Nonsense and Poliomyelitis

In THE JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION, 124:4:236, January 22, 1944.

Since the demonstration of the value of the treatment of poliomyelitis described by Miss Kenny, studies have been made in an attempt to explain the physiologic and pathologic conditions associated with the observed effects. The adherents of the Kenny theory have asserted that the harm of infantile paralysis is due to "spasm" of the affected muscles rather than to a flaccid paralysis. Qualified investigators have shown that this is not the case. As stated recently by Cobb, it is being demonstrated once more in the history of medicine that new and empirical methods of treatment backed by uncritical enthusiasm may produce many cures but much physiological nonsense. The treatment may be good, but the *ex post facto* conclusions of the therapist usually are bad.

### Muscle Contraction, Fatigue and Training: A Review of the Physiologic Literature

Karl Harpuder, M.D., New York. In ARCHIVES OF PHYSICAL THERAPY, 25:3:135, March 1944.

This review consist of four parts, namely: the physiologic chemistry of muscle contraction, the physiology of muscle fatigue, the systemic syndrome of fatigue and the physiology of training. Parts 3 and 4 will be published in a later issue of the ARCHIVES.

### Physical Therapy in Medical Education

Eben J. Carey, M.D., Marquette University School of Medicine, Milwaukee. In ARCHIVES OF PHYSICAL THERAPY, 25:2:72, February 1944.

During the World War I, Surgeon General Ireland strongly supported the neglected field of physical therapy. The American Congress of Physical Therapy came into being as a result of the postwar work of rehabilitation of those suffering from physical disabilities. Enormous demands are now being made which will increase in the future on those who use the various physical agents in the reconstruction of the normally functioning human body. The field of physical therapy has had an uphill and difficult road to final recognition. This was due to the difficulties of evaluating the true from the spurious. The accumulation of basic scientific facts was needed before adequate clinical application could be made. Physical therapy, as one aspect in the field of clinical medicine, now deserves a place in the curriculum of the medical school.

Our duty to medical students and the medical profession will not be fulfilled until each medical school formulates a teaching program in physical therapy. We owe this duty likewise to the public, because physical therapy is part of the art of healing.

The individual patient expects his physician to relieve pain and suffering and to be a healer of the ills of the human body. The ethical methods of diagnosis and therapy employed by the physician do not concern the patient as long as relief is given. It is probably this relief to the patient which has been lacking in the treatment of certain diseases that has led to the rise of cults and quacks for treatment of derangements of the locomotor apparatus. More original research is needed in this field, but in spite of our lack of knowledge there is ample evidence of the relief given to man by the use of physical agents. It is the duty of every administrative officer of a curriculum to see that the medical student has an opportunity to learn what is already known in this important field of physical therapy. The present national emergency is a challenge to each of us to see that physical therapy is no longer neglected in our medical curriculum for undergraduate medical students.

### Heat in the Treatment of Shock

Andrew W. Kay, M. G. Glas., F.R.C.S.Ed., Hall Tutorial Fellow, University of Glasgow. In BRITISH MEDICAL JOURNAL, 4331:40, January 8, 1944.

The application of heat has become fully established as a cardinal principle in the treatment of traumatic shock. It has been believed to exert a favorable influence, mainly by relieving the cutaneous vasoconstriction and thus augmenting the venous return. The possibility that the cutaneous vasoconstriction is a compensatory mechanism and that heat may be harmful has only recently been entertained.

Fifteen normal subjects were exposed for one hour to the hot-air cradle. Intravenous saline was administered to 10 of these, and intravenous plasma to 5.

A progressive rise in pulse rate and venous pressure, together with a progressive fall in arterial blood pressure, was observed in all cases. Symptoms resulted, including nausea, vomiting, dehydration, headache, perspiration, muscular pains, and exhaustion. In certain cases these were severe.

These findings would appear to contraindicate the prolonged use of heat in the treatment of patients suffering from traumatic shock.

### Pes Planus

Major Frederic W. Ilfeld, Medical Corps, A.U.S. In J.A.M.A., 124:5:281, January 29, 1944.

Of course no orthopedic aid can be effective without a proper fitting shoe. Length of the sole should allow a thumb's breadth from the great toe to the end of the shoe with full weight bearing, preferably tested with the soldier carrying a pack (50 to 70 pounds). Common aids in foot hygiene include the lacing of shoes loosely at the bottom, snug in the middle and loose at the top. This affords support to the longitudinal arch. Top holes do not need to be laced. Use of government issue foot powder, massage, manipulation, contrast baths, exercises, wearing two pairs of socks and cutting toenails straight across are helpful in relieving and preventing foot symptoms.

# Book Reviews

**Textbook of Physiology.** *By William D. Zoethout, Ph.D., Professor of Physiology in the Chicago College of Dental Surgery, Loyola University, Chicago, and W. W. Tuttle, Ph.D., Professor of Physiology, College of Medicine, State University of Iowa, Iowa City. Eighth edition. Cloth. Price, $4.75. Pp. 728, with 311 illustrations. St. Louis: The C. V. Mosby Company, 1943.*

In this book far more space has been devoted to the practical side of nutrition, physical exercise, mental work, fatigue and kindred topics than usually is found in texts on physiology. There also are excellent chapters that can be easily read and understood on regulation of body temperature, the skin, the receptors or sense organs, reflex actions, the spinal cord, the brain and the autonomic nervous system. The above facts and the fact that this book is intended to fill the gap between the larger texts of which there are many in the field and those offering a briefer course suggest that this book may be used as a text in physiology in the schools for physical therapy technicians. It covers the subject of physiology but since this work is intended for those having a limited length of time for the acquisition of basic knowledge of the subject, it is recommended to physical therapists.

**Fractures and Fracture Treatment in Practice.** *By Kurt Colsen, M.D., Tutor to the Department of Surgery, Registrar to the Surgical Firm of the University of the Witwatersrand, Johannesburg, Fabrikoid. Price, 12s. 6d. Pp. 147, with 157 illustrations. Johannesburg: Witwatersrand University Press, 1942.*

This is the most concise presentation of fractures that has appeared. Especially to be recommended are the diagrams of fractures which are simple, not overloaded with detail and each drawing depicts what it is supposed to indicate.

This small book can be recommended to students studying for examinations and to general practitioners wanting a brief review of the subject.

**The 1943 Year Book of Physical Therapy.** *Edited by Richard Kovacs, M.D., Professor of Physical Therapy, New York Polyclinic Medical School and Hospital; Attending Physical Therapist, Manhattan State, Columbus and Westside Hospitals; Visiting Physical Therapist, Department of Correction, Hospitals of New York City and Harlem State Hospital; Consulting Physical Therapist, New York Infirmary for Women and Children, Mary Immaculate Hospital, St. Charles Hospital and Hackensack Hospital. Cloth. Price, $3. Pp. 409, with 75 illustrations. Chicago: The Year Book Publishers, 1943.*

This book, edited by one of the leaders in the field concerned, is especially valuable during the war. The editor has done an excellent job in selecting the outstanding abstracts of the work done in physical therapy in 1943. The wealth of information included in this volume is amazing. Starting with Part One on physical therapy methods and ending with Part Two on applied physical therapy, the author has covered everything new that has appeared in the current year. The work is well illustrated and the illustrations and the bibliography are apt and to the point.

This monograph serves to emphasize the increasing importance of physical therapy in the armed forces and in civilian life, and it is highly recommended to all physical therapists.

**Fundamental Exercises for Physical Fitness.** *By Claire Colestock, A.B., M.A., Assistant Director, Physical Education, City Schools, Pasadena, California, and Charles Leroy Lowman, M.D., F.A.C.S.; Chief of Staff, Orthopaedic Hospital, Los Angeles, California. Cardboard. Price, 50 cents. Pp. 314. New York: A. S. Barnes and Company, 1943.*

This is a supplement to and includes selections from "Corrective Physical Education for Groups" by Lowman, Colestock and Copper. The authors state: "History is repeating itself. One wonders how many wars it is going to take to get us sufficiently aroused to really get at the bottom of the physical fitness and health problems of our children. . . .

"Administrators in general, however, yielded to the clamor and demands of the students, alumni, and a sports-loving public, and continued along the old traditional lines of putting the emphasis on activities rather than health needs. There were ten books on various technics, methods and descriptions of sports, games, plays and dances to one on health subjects and what to do for them. In the present emergency the schools want physical fitness and health programs."

The authors, realizing the need, have written this small manual on the urgent need for fundamental exercise for physical fitness; the intelligent planning and application of exercise; screening methods; corrective physical education for groups; case studies of injuries received because of unintelligent application of strenous activities and exercises to immature and growing boys; the analysis of exercises in common use, and relaxation.

This book should be read by school physicians, school administrators, physical education teachers and health workers.

**The Hospital in Modern Society.** *Edited by Arthur C. Bachmeyer, M.D., Director, University of Chicago Clinics; Director, Hospital Administration Course, University of Chicago, and Gerhard Hartman, Ph.D., Director, Newton Hospital, Newton Lower Falls, Mass. Cloth. Price, $5. Pp. 768. New York: The Commonwealth Fund, 1943.*

Here in one volume is the essence of the published material on hospital administration. This collection of readings were selected from the literature in the hospital field and in the allied fields of medicine, public health, management and organization, law, sociology, and psychology. The material, according to the editors, was taken exclusively from the periodical literature and from transactions and committee reports, because it was felt that the few books in the field would be in the libraries of persons professionally interested.

It covers many subjects such as history; hospital service; the trustee, hospital organization and management; the hospital administrator; medical staff organization and relationships; nursing education and nursing service; operating room; obstetrical service; x-ray service; out-patient department; special services; medical social service; clinical and pathological laboratories; pharmacy; medical records; admitting and discharge; financial control; legal aspects; hospital construction, plant maintenance; purchasing food service; housekeeping; laundry management and linen control; personnel relations; public relations; group hospital and health insurance; and public health. Under the special services the editors give an article on the physical therapy department in small, medium and large hospitals.

This book can be recommended to the hospital administrator or the administrative assistant, hospital department heads or to the student in hospital administration to enhance their knowledge of the hospital through systematic study.

**Nervousness, Indigestion and Pain.** *By Walter C. Alvarez, M.D., Professor of Medicine, University of Minnesota (Mayo Foundation); Consultant in the Division of Medicine, The Mayo Clinic, Rochester, Minnesota. Cloth. Price, $5. Pp. 488. New York: Paul B. Hoeber, Inc., 1943.*

This is an interesting and different sort of a book because it describes what the author has heard and seen, and is not a rehash of the literature. He discusses in this book nervousness, indigestion and pain because all gastoenterologists must be prepared to study and treat them together. Alvarez says: "I discovered this years ago when a psychoanalyst referred to me a psychopathic woman with an irritable digestive tract. He said, 'You take care of her colon and I'll take care of her mind,' but this division of labor didn't work well, because on the days when her colon was 'screaming at her' she couldn't listen to his psychotherapy, and when she came complaining to me about a mucous colic I hated to start any treatment until I had found out what particular mental conflict had that day thrown nerves into an uproar."

Alvarez makes a statement that can apply to many branches of medicine: "The gastroenterologist just has to be a psychiatrist of sorts." In this book he deals more with symptoms and their meaning than with disease entities, more with the handling of patients than with the giving of medicines, and more with the puzzling, poorly understood and poorly described abdominal discomforts and indigestions than with the well-known organic diseases such as ulcer, cholecystitis and cancer.

This book will help the young physician to see that today we are trusting too much to our new methods of diagnosis; that there are some bad and dangerous trends in medical practice; that difficult problems are arising; and that the old methods of taking an adequate history, observing the patient, and thinking about the diagnosis just cannot be dispensed with. This book should be read by every physician.

**Memoir of Walter Reed: The Yellow Fever Episode.** *By Albert E. Truby, Brigadier General, United States Army, Retired. Cloth. Price, $3.50. Pp. 239, with illustrations. New York: Paul B. Hoeber, Inc., 1943.*

This is the story of the early professional life of General Truby from the time he was a resident at the University of Pennsylvania Hospital. Major Walter Reed was on his examining board for admission to the Army Medical Corps. After he passed this examination he was immediately launched into the midst of great historical events. General Truby says: "The greatest of these events was the conquest of yellow fever and the man to become most famous was Walter Reed, an Army surgeon."

This book is particularly interesting to the medical profession now because it relates the role of our profession in another war. General Truby was commissioned in 1898 and assigned to duty at Fort Meyer, Virginia, where all the vacant buildings were utilized as wards of a general hospital which was constantly filled with typhoid fever cases from various camps. Only those who remember typhoid wards will appreciate how much the entire medical profession were overworked. Hemorrhages, perforations and other complications of this terrible disease were constantly taking place.

The author soon was sent to Cuba. Here he found that Major Gorgas was the Department Surgeon. Of course, Major Gorgas is remembered from the Panama Canal and as Surgeon General of the Army in World War I. While General Truby was in Cuba a Captain in the Medical Corps, Leonard Wood, was promoted to a Major General of Volunteers and ranked all other officers in Cuba. He became Governor General of Cuba in 1899. The author notes that after much controversy about Wood's appointment, public opinion in time became almost universal that he was the ideal man for the position because of his medical background as well as his executive ability. All problems in Cuba were minor in comparison to the maintenance of the health of his command.

When Reed landed in Cuba in June 1900 and came to live at the post hospital of Columbia Barracks, Lieutenant Truby was on duty there as Executive Officer. At this hospital Reed and the members of his Board conducted their history-making experiments on yellow fever. The frontispiece of this book shows the scene of Cornwell's painting "Conquerors of Yellow Fever," depicting one of the great moments in medical history. This scene is laid at the steps of the quarters for medical officers of this hospital.

The theory of the transmission of yellow fever was published in 1881 by Dr. Carlos Finlay of Havana but it made no converts in nineteen years. His theory, after so many years of incredulity, upon its vertification by the Reed Board, was accepted by all the world. This memoir is a precious source of inside information and should be in the library of every physician.

**Health for the Having: A Handbook for Physical Fitness.** *By William R. P. Emerson, A.B., M.D., Professor of Pediatrics (Emeritus), Tufts College Medical School; Medical Consultant in Physical Fitness for the Aetna Life Insurance Company, and formerly for Dartmouth College. Cloth. Price, $1.75. Pp. 146. New York: The Macmillan Company, 1944.*

This book can be recommended to the lay public who ask health questions. This book explains what steps are necessary for each one of us to take in order to prevent crippling degenerative disease and also to attain and maintain high buoyant health. It teaches the causes of underweight in youth and overweight in maturity and how they can be most easily corrected.

This small, practical, easily read volume enables us to make a valuable check on our health status. It is recommended for this purpose.

**Organizing to Help the Handicapped: A Brief Guide for Voluntary Associations for the Crippled.** *By T. Arthur Turner. Price: Cloth, $1; paper, 50 cents. Pp. 165. Elyria, Ohio: National Society for Crippled Children, Inc., 1944.*

This book describes the organization and administration of agencies to help the handicapped. The following subjects are considered: the care of the handicapped as a social principle; the federal-state programs for crippled children; the federal-state programs of physical and vocational rehabilitation; the public programs for the education of handicapped children; the relationship of public and private agencies for the handicapped; the general service program of the voluntary group and special projects such as summer camps; the sheltered and homebound; employment of the handicapped; community health and the prevention of handicaps. The author also discusses the structure and administration of associations for the physically handicapped; publicity, promoting legislation and the creative spirit in work for the physically handicapped. This is a must book for administrators of programs for the handicapped.

**Medical Physics.** *Editor-in-Chief, Otto Glasser, Ph.D., Head, Department of Biophysics, Cleveland Clinic Foundation; Professor of Biophysics, Frank E. Bunts Educational Institute; Consulting Biophysicist, University Hospitals of Cleveland, Cleveland, Ohio, and 23 Associate Editors. Cloth. Price, $18. Pp. 1744. Chicago: The Year Book Publishers, Inc., 1944.*

The editor-in-chief and the associate editors assure the reader that this book is now the authority in its field. It considers anatomy, bacteriology, biometrics, biophysics, dermatology, hematology, medicine, neurology, nuclear physics, ophthalmology, optics, orthopedics, otolaryngology, pathology, pediatrics, photography, physical chemistry, physical therapy, physics (instruments and methods), physiology, radiology, surgery and urology.

Dr. Walter J. Zeiter, Head, Department of Physical Therapy, Cleveland Clinic Foundation, is the Associate Editor of physical therapy. This section considers the following: "Effect of Heat, Exercise and Posture on the Circulation" by E. A. Hines, Jr., and Walter F. Kvale; "Climatic Factors in Health and Disease" by C. A. Mills; "Colonic Irrigations" by Hilton S. Read; "Electric Shock Therapy in Mental Disorders" by S. Eugene Barrera, and L. B. Kalinowsky; "Electrosurgery" by William H. Schmidt; "Fever Therapy by the Air Conditioned Cabinet" by Walter M. Solomon and R. M. Stetcher; "Fever Therapy by Short Wave Diathermy: Inductopyrexia" by Milton G. Schmitt; "Heliotherapy: Measurements and Application of Solar Rays" by Henry Laurens; "Hydrogymnastics" by K. G. Hansson; "Hydrotherapy" by John F. Wyman; "Manipulation of the Spine" by Frederick A. Jostes; "Massage" by Ralph Pemberton and C. W. Scull; "Occupational Therapy" by Marjorie Taylor; "Physical Exercise" by F. H. Ewerhardt; "Heat and Cold" by J. S. Coulter; "Light" by Frank H. Krusen and E. C. Elkins; "Low Frequency Currents" by Richard Kovacs; "Low and High Frequency Fields and Currents" by H. J. Holmquest; "Medical Diathermy" by Walter Zeiter; "Spa Therapy" by Walter S. McClellan; "Posture" by F. H. Ewerhardt; "Radiation: Photophysiologic and Photopathologic Processes" by Harold F. Blum; "Radiation: Sources of Ultraviolet and Infra-red" by W. E. Forsythe and E. I. Adams; "Radiation Spectrum" by Otto Glasser; "Refrigeration Therapy" by Temple Fay; "Rest: Local" by Loring T. Swaim; "Rest: Mental and Physical" by Edmund Jacobson; "Resuscitation" by Hart E. Fisher; and "Static Electricity" by Myron M. Schwarzschild and William Bierman.

The above list of authorities writing on physical therapy, the 23 associate editors and the 251 contributors make this the outstanding work in medical physics. It should be in the medical library of every medical school, civilian hospital and the hospitals of the armed forces. As a book of reference on the subject of medical physics it cannot be too highly recommended.

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